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Contents

Zoology Volume 33

Page

No 1 A revision of the spider genera *Belippo* and *Myrmarachne* (Araneae: Salticidae) in the Ethiopian region.
F. R. Wanless 1

No 2 A revision of the Lake Victoria *Haplochromis* species (Pisces, Cichlidae) Pt. VIII.
P. H. Greenwood & C. D. N. Barel 141

No 3 Mites of the family Myobiidae (Acarina: Prostigmata) from mammals in the collection of the British Museum (Natural History).
A. Fain 193

No 4 Miscellanea 233

The genus names *Calicella* Hincks and *Calycella* Hincks (Coelenterata: Hydrozoa). P. F. S. Cornelius 233

On the identity of the spider *Emertonius exasperans* Peckham & Peckham (Araneae: Salticidae). F. R. Wanless 235

A revision of the spider genus *Bocus* Simon (Araneae: Salticidae).
F. R. Wanless 239

A revision of the spider genus *Sobasina* (Araneae: Salticidae).
F. R. Wanless 245

A revision of the spider genus *Marengo* (Araneae: Salticidae).
F. R. Wanless 259

A new species of *Steganacarus* (Acari, Cryptostigmata) from Israel.
B. W. Parry 279

The larval development of the portunid crab *Macropipus pusillus* (Leach) reared in the laboratory. A. L. Rice & R. W. Ingle . . 287

No 5 A review of the pharyngeal apophysis and its significance in the classification of African cichlid fishes.
P. H. Greenwood 297

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British Museum (Natural History)**

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F. R. Wanless

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A revision of the spider genera *Belippo* and *Myrmarachne* (Araneae: Salticidae) in the Ethiopian region

F. R. Wanless
Department of Zoology, British Museum (Natural History), Cromwell Road, London SW7 5BD

Contents

Synopsis . . . 1
Introduction . . . 1
Methods and terminology . . . 2
Abbreviations of depositories . . . 3
Revision of genera . . . 5
  The genus *Belippo* . . . 5
    Definition . . . 5
    Diagnosis . . . 7
    Biology . . . 7
    Key to species . . . 7
  The genus *Myrmarachne* . . . 18
    Definition . . . 19
    Diagnosis . . . 19
    Species groups . . . 19
    Variation . . . 20
    Biology . . . 21
    Distribution in the Ethiopian region . . . 23
    Key to species . . . 23
Species Incertae sedis . . . 126
Unavailable names . . . 126
Acknowledgements . . . 126
References . . . 135
Index . . . 137

Synopsis

The spider genera *Belippo* Simon and *Myrmarachne* Macleay in the Ethiopian region are revised. All the 7 known species of *Belippo* (of which 2 are new) and 56 known species of Ethiopian *Myrmarachne* (of which 24 are new) are described and figured. Biological and distributional data are given and separate keys to the species are provided. In *Myrmarachne* certain species groups based on the structure of the genitalia are proposed. The type-material (including 60 holotypes) of 84 nominate species was examined and 23 lectotypes and 1 neotype are newly designated. One generic and 21 specific names are newly synonymized and 6 new combinations are proposed.

Introduction

The Salticidae is a large, well-defined cosmopolitan family of spiders with most species in the warmer regions of the world. More than 3000 species, classified in about 400 genera, have been described but a large proportion of these cannot be recognized with certainty on the basis of the existing literature.

The genera of this family were grouped by Simon (1901) into three artificial sections, the Pluridentati, Unidentati and Fissidentati, based on the dentation on the lower margin of the chelicerae.

Bull. Br. Mus. nat. Hist. (Zool.) 33 (1): 1–139
Issued 23 February, 1978

Such a system of classification is unacceptable, as Prószyński (1971a) has already pointed out, but a more natural system cannot be proposed until existing genera have been revised. This paper, the first of a proposed series on the Salticidae, revises the ant-like genera *Belippo* and *Myrmarachne* in the Ethiopian region.

Belippo Simon, 1910, was formally monotypic but in the present paper it has been redefined and expanded to include seven species that are all West African in distribution.

Myrmarachne Macleay, 1838, contains at present 164 species. Although the genus is cosmopolitan only 9 species have been described from the New World, all from the Neotropical region (Galiano, 1969, 1974). In the Ethiopian region 58 species are now known and according to Roewer (1954) there are 12 species in the Palaearctic region, 76 species in the Oriental region and 9 species in the Australian sub-region. Provisional studies suggest that the Oriental region will prove to be far richer in species of this genus than our present knowledge indicates.

Simon (1886) described the first species of *Myrmarachne* from Africa and six years later Peckham & Peckham (1892) described the first Madagascan species in an early review of ant-like Salticidae. In their study, all of the known ant-like salticid genera were redefined mainly on the general form of the carapace and on the size and position of the eyes; they also proposed numerous new species and several new genera including *Iola* and *Hermosa*. In proposing his classification of the family Salticidae, Simon (1901) redefined *Myrmarachne* and made it the type of a suprageneric group, the 'Myrmarachneae'. He synonymized *Iola* and *Hermosa* with *Myrmarachne* and transferred a number of the Peckhams' species which had been described in *Salticus* to *Myrmarachne*. In a supplement to his main work, Simon (1903) described a new genus *Bizone* for an unusual Madagascan species. After the pioneer works of Simon and the Peckhams there followed a period in which many new species were described and several important papers by Szombathy (1913, 1915), Lessert (1925a, 1925b, 1942), Berland & Millot (1941) and Lawrence (1938, 1941) did much to increase our knowledge of the species in the Ethiopian region. *Myrmarachne* is now one of the largest genera in the Salticidae and includes more species than any of the other ant-like salticid genera. In 1965 Roewer revised *Myrmarachne* in the Ethiopian region as part of his studies on the Lyssomanidae and Salticidae–Pluridentati. Roewer's work, published posthumously, is unsatisfactory, the descriptions and figures are inadequate and the key to *Myrmarachne* is based on unreliable characters. Of the 22 new species of *Myrmarachne* described by Roewer, 12 have been synonymized in this present work.

Mimicry in spiders has been reviewed by Peckham (1889), Pocock (1909) and Brignoli (1966). Hingston (1927) has described behaviour in several unidentified Indian *Myrmarachne*. However, our knowledge of the biology of this genus is largely based on the excellent studies of Mathew (1934, 1940, 1954) on *M. plataleoides* (O. P.-Cambridge), from India, and Collart (1929a, 1929b, 1941) on *M. foenisex* Simon, from Africa. Additional observations on *M. plataleoides* have been made by Bhattacharya (1939) on moulting and metamorphosis, and Marson & Carpenter (1946) and Marson (1947) on behaviour.

Methods and terminology

Specimens were examined in a dish of alcohol, the bottom of which was covered with glass beads. The drawings, except those of the vulvae, were made with the aid of a camera lucida attached to a dissecting microscope. The epigyne and male left palp (when present) were removed for study. After drawing, the epigyne was cleared in warm lactic acid on a well slide and redrawn with the aid of a camera lucida attached to a compound microscope. It was then returned to alcohol and the genitalia stored in micro-vials. Specimens used for scanning electron microscopy were air dried and vacuum coated with gold before examination.

The synonymy only includes more important citations and references of nomenclatorial significance; for complete synonymy see Bonnet (1945–61).

The terminology is explained in Figs 1–3 and examples of microsculpture are shown in a series of scanning electron micrographs (Pls 1–3). The terms used to describe microsculpture are sometimes difficult to interpret as they have been used in different senses by various authors (Eady, 1968). This is not surprising as the scanning electron microscope reveals detail that is far beyond the resolution of the dissecting microscope. All the specimens examined in this study exhibit more than one form of microsculpture which may intergrade to form complex patterns or abruptly change from one type of sculpture into another. Fine reticulate forms of sculpture, which often occur on the thoracic part, cannot always be resolved with the dissecting microscope and it is often difficult to decide which form of sculpturing is present, particularly as lighting effects can cause an apparent reversal of reticulate and papillate structure. A similar effect can even be illustrated by viewing Pl. 1h upside down. The most common patterns that can normally be seen with the dissecting microscope are punctured-reticulate (Pl. 1a, b), especially within the eye region, and rugulose with irregular cross furrows (Pl. 1c, d) on the dorsal surface of the chelicerae. Other widespread but less conspicuous patterns are alutaceous on the abdomen (Pl. 1g) and raised reticulate on the sternum (Pl. 1e, f). Papillae (Pl. 3c, d) are probably more widespread than I have indicated in the descriptions as they may have been overlooked; the thoracic papillae of *Myrmarachne marshalli* Peckham & Peckham and *M. legon* sp. n. were not noticed until specimens were examined with the stereoscan microscope. Rippling (Pl. 2d), smooth and irregular punctures (Pl. 2b) are fairly rare but sometimes clear enough to be used as a diagnostic character.

The measurements, which are accurate to 0·05 mm, were made with an eyepiece micrometer and the system used is explained in Figs 1–2. There is no point in always giving absolute measurements (e.g. in mm) as their principal value is in their relation to the measurements of other parts. Eye size is expressed in ratios made from the type-specimen but variation is not given. Four standard abbreviations, AM, AL, PM, PL, refer respectively to the anterior median, anterior lateral, posterior median and posterior lateral eyes. Eye interdistances are denoted by dashes, i.e. PM–PL refers to the distance between the posterior median and posterior lateral eyes. Eye ratios refer to the diameter of the lens and not the encircling pigment which is normally present.

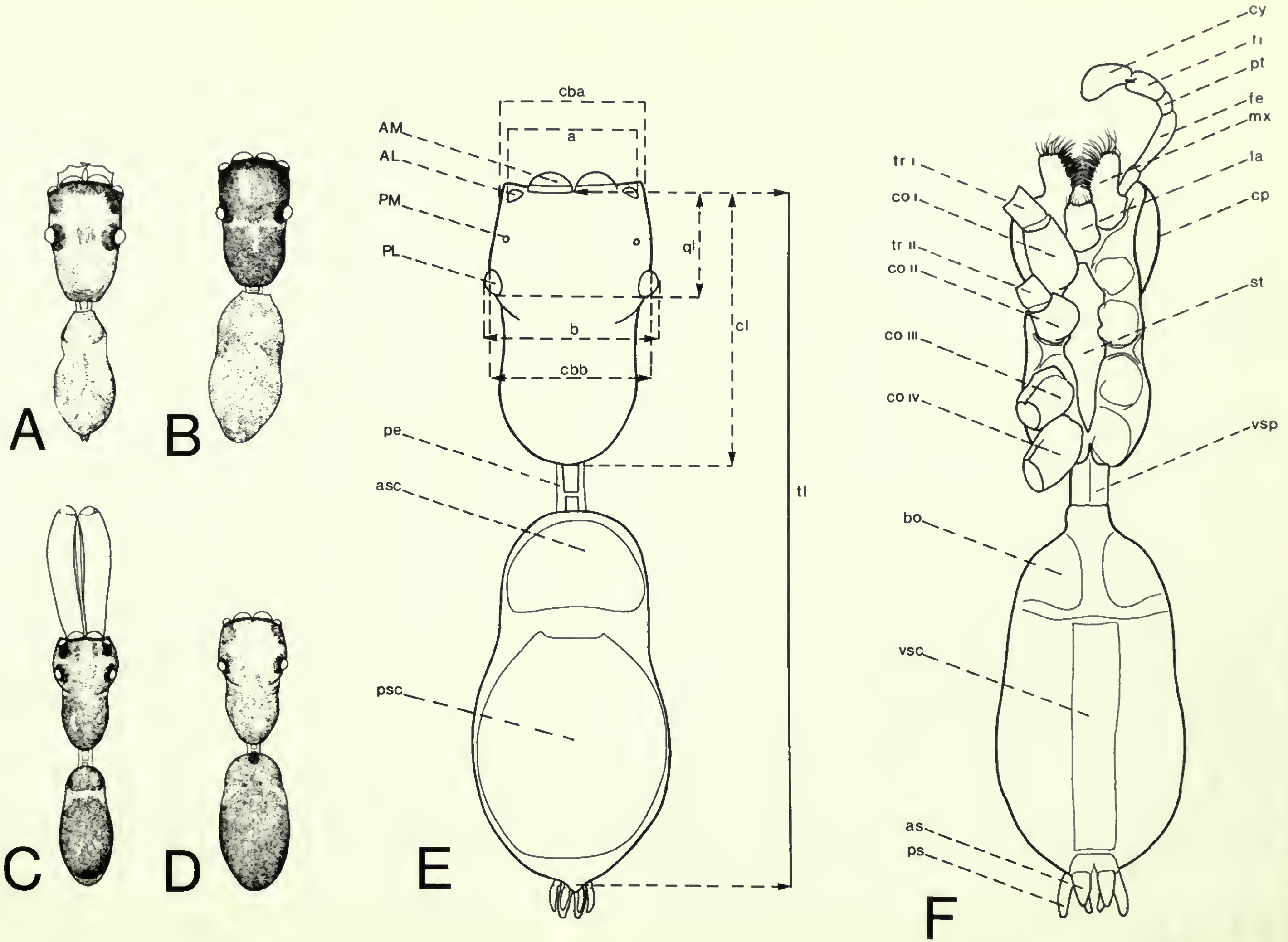
From the measurements several indices are derived:

a: width of eye row I/carapace width at that point; decreasing values below 1·0 indicate a space between the anterior lateral eyes and the sides of the carapace at that point.
b: width of eye row III/carapace width at that point; increasing values above 1·0 indicate that the posterior lateral eyes project over the sides of the carapace at that point.
c: quadrangle length/carapace length; a value of 0·50 indicates that the eye region and thoracic part are of equal length.
d: chelicerae length (males only)/carapace length; increasing values above 1·0 indicate that the chelicerae are longer than the carapace.
e: tibia plus patella IV/carapace length; decreasing values below 1·0 indicate that the tibia plus patella IV are shorter than the carapace.

The indices a, b and d exhibit a greater range of variation in males and are good indicators of allometric growth. Ratio c is less variable but it is sometimes used as a diagnostic character. Ratio e is the most useful index to be derived from measuring the leg segments of type-specimens, it is rather variable but can be useful for separating closely related females. All indices can be derived from whole specimens and dissection is not necessary. In the figures the palpal setae have not been included in order to show the shape of the tibial apophysis clearly.

Abbreviations of depositories

BMNH	British Museum (Natural History), London
CNR, Florence	Consiglio Nazionale delle Ricerche, Università Degli Studi di Firenze, Firenze, Italy (Dr A. Martelli)
FS, Frankfurt am Main	Forschungsinstitut Senckenberg, Natur-Museum, Senckenberg, Frankfurt am Main, West Germany (Dr M. Grasshoff)
MB, Lisbon	Museu Bocage, Lisbon, Portugal (Dr J. de A. Fernandes)
MCSN, Genoa	Museo Civico di Storia Naturale, Genoa, Italy (Dr L. Capocaccia, Dr R. Poggi and Professor E. Tortonese)
MCZ, Cambridge	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A. (Professor H. W. Levi)
MD, Dundo	Museo do Dundo, Dundo, Luanda, Angola (Dr A. de Barros Machado)
MHN, Geneva	Muséum d'Histoire Naturelle, Geneva, Switzerland (Dr B. Hauser)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MNHN, Paris	Muséum National d'Histoire Naturelle, Paris, France (M M. Hubert)
MNHU, Berlin	Museum für Naturkunde der Humboldt-Universität, Berlin, East Germany (Dr M. Moritz)
MRAC, Tervuren	Musée Royal de l'Afrique Centrale, Tervuren, Belgium (Professor P. L. G. Benoit)
NM, Pietermaritzburg	Natal Museum, Pietermaritzburg, South Africa (Mr B. Lamoral)
NR, Stockholm	Naturhistoriska Riksmuseet, Stockholm, Sweden (Professor T. Kronestedt)
TM, Budapest	Termeszéttudományi Múzeum Állattára, Budapest, Hungary (Dr S. Mahunka)
ZIZM, Hamburg	Universität Hamburg, Zoologisches Institut und Zoologisches Museum, Hamburg, West Germany (Dr G. Rack)

Revision of genera

Genus *BELIPPO* Simon

Belippo Simon, 1910 : 416. Type-species *Belippo anguina* Simon, by monotypy. Roewer, 1954 : 939· Bonnet, 1955 : 875. Roewer, 1965 : 78.

The present status of *Belippo* is based on the assumption that the male of *Belippo anguina* Simon (the type-species) will prove to have a movable apophysis on the palpal tibia and thus agree with the definition given below.

DEFINITION. Ant-like spiders ranging from about 3·5 to 7·0 mm in length. Males sexually dimorphic. *Carapace*: shape variable; constriction usually shallow with two dorsal trichobothria but lateral wedge-shaped patches of whitish hairs lacking (cf. *Myrmarachne*); sculpturing variable; colour patterns usually lacking; not hirsute. *Eyes*: anterior row subcontiguous or contiguous with apices procurved or level in frontal view; middle row midway or nearly midway between anterior lateral and posterior lateral eyes; posterior row equal to or wider than anterior row; quadrangle length between 45 and 50 per cent of carapace length (cf. *Myrmarachne*). *Clypeus*: very low. *Female chelicerae*: normal with 4 or 5 promarginal and 5–7 retromarginal teeth; *Male chelicerae*: strongly developed, porrect or slightly porrect, not grossly elongate; spurs present; fang apophysis absent; groove with 3 or 4 promarginal and 6–8 retromarginal teeth. *Maxillae*: elongate, more or less parallel. *Labium*: elongate. *Sternum*: elongate. *Pedicel*: moderately long. *Abdomen*: shape variable; constriction present or absent, sometimes reinforced with

Fig. 1 (A, B) generalized body form of *Belippo* in dorsal view (legs and palps omitted): (A) ♂; (B) ♀. (C, D) generalized body form of *Myrmarachne* in dorsal view (legs and palps omitted): (C) ♂; (D) ♀. (E, F) structure of *Myrmarachne* (schematic); (E) dorsal view; (F) ventral view.

Explanation of abbreviations in Figs 1–3. *a*, breadth of eye row I; *adsp*, anterior dorsal segment of pedicel; *ag*, accessory gland; *AL*, anterior lateral eye; *AM*, anterior median eye; *as*, anterior spinneret; *asc*, anterior scutum; *b*, breadth of eye row III; *bo*, branchial operculum; *bt*, bristle tuft; *cba*, carapace breadth at level of anterior lateral eyes; *cbb*, carapace breadth at level of posterior lateral eyes; *ch*, chelicera; *chl*, cheliceral length; *cl*, carapace length; *cly*, clypeus; *co*, coxa; *con*, constriction; *cp*, cephalic part of head; *cym*, cymbium; *da*, distance between anterior lateral and posterior median eye; *dal*, diameter of anterior lateral eye; *dam*, diameter of anterior median eye; *de*, depression for protection of embolus; *dp*, distance between posterior median and posterior lateral eye; *dpl*, diameter of posterior lateral eye; *dps*, distal prolateral spur; *dsd*, distal seminal duct; *ef*, epigastric fold; *emb*, embolus; *ep*, epigyne; *f*, flange of retrolateral tibial apophysis; *fa*, fang apophysis; *fch*, female chelicera; *fe*, femur; *fg*, fang; *la*, labium; *lp*, lateral pouch; *ltp*, length of tibia plus patella but measured on leg IV; *mch*, male chelicera; *meo*, margin of epigynal opening; *mmc*, modified margin of cymbium; *ms*, median spinneret; *mt*, metatarsus; *mta*, movable tibial apophysis; *mx*, maxilla; *odsd*, opening of distal seminal duct; *pe*, pedicel; *pd*, proximal depression; *PL*, posterior lateral eye; *PM*, posterior median eye; *pp*, pars pendula of the embolus; *pr*, proximal seminal duct; *prt*, prolateral teeth; *ps*, posterior spinneret; *psc*, posterior scutum; *pt*, patella; *psp*, primary spermatheca; *ql*, quadrangle length; *rs*, retrolateral spur; *rt*, retrolateral teeth; *sd*, seminal duct; *sp*, spermatheca; *sr*, seminal reservoir; *ssp*, secondary spermatheca; *ta*, tarsus; *tap*, tibial apophysis; *td*, tibial denticles; *teg*, tegulum; *ti*, tibia; *tl*, total length; *tp*, thoracic part or thorax; *tr*, trochanter; *vsp*, ventral segment of pedicel.

scanty band of whitish hairs; scuta present in males, lacking or vestigial in females. *Legs*: slender, femora I dorsoventrally enlarged and slightly compressed laterally; formula 4132; dorsal and lateral spines absent, ventral spines present on legs I and II but usually absent on legs III and IV. Claw tufts present but scopula lacking. *Female palp*: pallet-shaped. *Male palp* (Fig. 3A, C): with movable tibial apophysis and fixed retrolateral denticles. Embolus long and slender with two turns around the tegulum; the tip sometimes modified (Fig. 8F, G). Pars pendula present but conductor and median apophysis lacking. Tegulum subcircular with large seminal reservoir; cymbium with proximal ectal margin excavated or otherwise modified. *Epigyne* (Fig. 3B): comparatively simple with paired or unpaired openings and lateral pouches that are sometimes poorly defined or reduced (Figs 4F, 6I). Primary and secondary spermathecae present, connected by

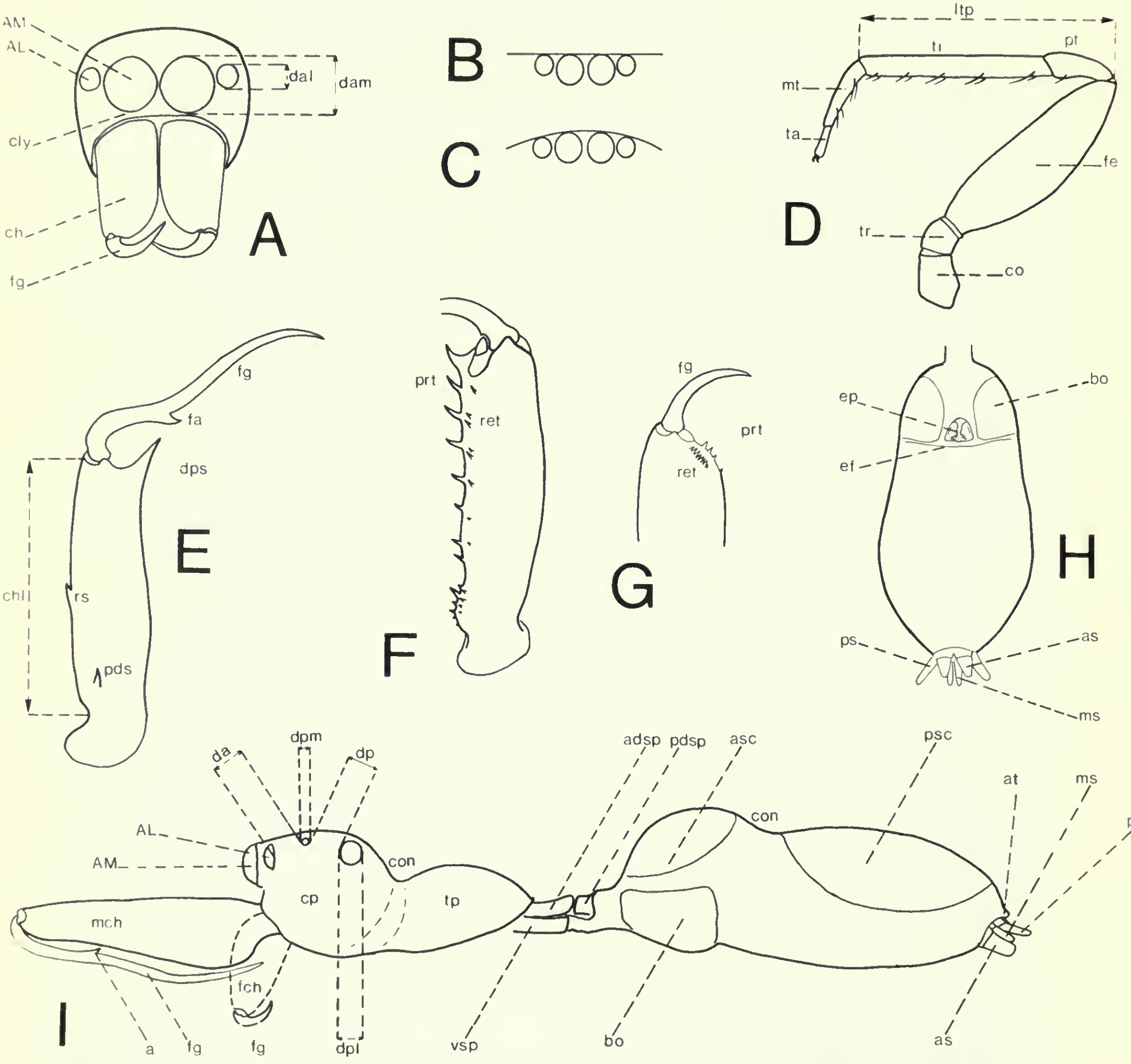
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Fig. 2 Structure of *Myrmarachne* (schematic): (A) cephalothorax in facial view; (B) eye row I with apices level in frontal view; (C) eye row I with apices procurved in frontal view; (D) leg I; (E) ♂ chelicera in dorsal view; (F) ♂ chelicera in ventral view; (G) ♀ chelicera in ventral view; (H) ♀ abdomen in ventral view; (I) lateral view. For explanation of abbreviations, see caption to Fig. 1.

median seminal ducts; the primaries distinguished by dorsal accessory glands; the secondaries very variable in shape and sometimes forming amorphous masses (Figs 6I, J; 7J, K).

The structure of the epigyne is not entirely clear as the opening for the reception of the embolus has not been located. The apparent distinction between globular and amorphous secondary spermathecae suggests the possibility of species groups but correlated differences in male palp structure are not evident.

Diagnosis. *Belippo* is separated from *Myrmarachne* by the movable tibial apophysis on the male palp and the presence of secondary spermathecae in females. A fuller diagnosis cannot be given until related genera have been revised. Its affinities are uncertain and at present I do not know of another salticid genus which has a movable apophysis on the palpal tibia. The presence of secondary spermathecae is also unusual although they are also found in *Sarinda* Peckham & Peckham, 1892, an unrelated genus of ant-like Salticidae from the Neotropical region (Galiano, 1965).

Biology. *Belippo* spiders are morphologically ant-like and since *B. ibadan* sp. n. and *B. calcarata* (Roewer) have been found in association with several species of ant it seems reasonable to assume that they are ant-mimics. However, apart from a few scattered collectors' notes, nothing is known of their biology.

Key to species of *Belippo*

Males

1 Palpal tibia clearly longer than broad (Fig. 5E) . . . . ***viettei*** (Kraus) (p. 10)
– Palpal tibia about as long as broad (Figs 7M; 8H) 2
2 Embolic tip shaped like a swan's head (Fig. 8F) . . . . . . ***cygniformis*** sp. n. (p. 16)
– Embolic tip otherwise 3
3 Embolic tip acuminate (Fig. 8G); abdomen with ventral scutum . . . ***ibadan*** sp. n. (p. 16)
– Embolic tip otherwise; abdomen without ventral scutum 4
4 Movable apophysis with one barb (Fig. 6H, L); carapace more constricted (Fig. 6E, G) with rippling between PL . . . . ***calcarata*** (Roewer) (p. 11)
– Movable apophysis with double barb (Fig. 7M); carapace less constricted (Fig. 7B) without rippling between PL . . . . ***milloti*** (Lessert) (p. 13)

Females

1 Carapace with longitudinal brownish bands (Fig. 4A, B) . . . . ***anguina*** Simon (p. 7)
– Carapace without longitudinal brownish bands 2
2 Secondary spermathecae small and globular (Figs 4F, 9C, D) 3
– Secondary spermathecae forming somewhat angular amorphous masses (Figs 6I, J; 7J, K) . 4
3 Epigynal openings and primary spermathecae subovate (Fig. 4F). . . . ***nexilis*** (Simon) (p. 9)
– Epigynal openings elongate, primary spermathecae rounded (Fig. 9C, D) . ***ibadan*** sp. n. (p. 16)
4 Carapace rippled between PL and with a more or less distinct thoracic hump (Fig. 6F) ***calcarata*** (Roewer) (p. 11)
– Carapace not rippled between PL and without a distinct thoracic hump (Fig. 7G) ***milloti*** (Lessert) (p. 13)

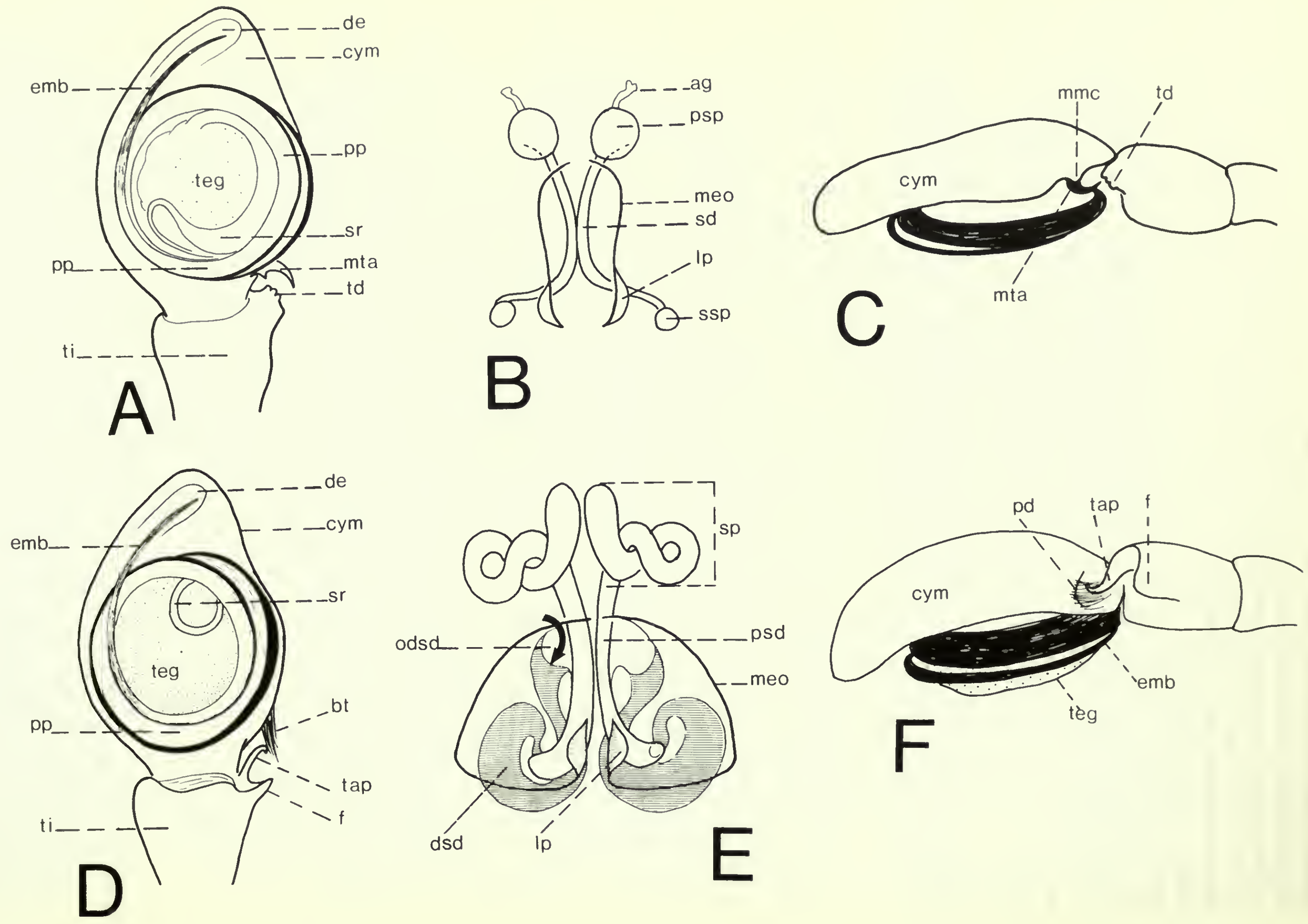
Belippo anguina Simon

(Fig. 4A, B, D)

Belippo anguina Simon, 1910 : 416, young ♀. LECTOTYPE ♀ [not young ♀ as stated by Simon] (here designated), São Thomé, Agua Ize (MCSN, Genoa) [Examined]. Roewer, 1954 : 939. Bonnet, 1955 : 875. Roewer, 1965 : 78. Prószyński, 1971b : 384.

Diagnosis. *Belippo anguina* is a distinctive species easily recognized by the elongate body form and carapace markings (Fig. 4A, B).

Male. Unknown.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FEMALE. *Carapace* (Fig. 4A, B): light yellow with yellowish guanin in eye area and brownish lateral bands from clypeal region to posterior margin of thoracic part. *Eyes*: anteriors contiguous with apices slightly procurved, fringed with white hairs. *Clypeus*: sparsely white haired. *Chelicerae*: light yellow-brown; promargin with 4 teeth, retromargin with 5. *Maxillae and Labium*: light yellow. *Sternum*: elongate, margins poorly defined; whitish yellow. *Abdomen* (Fig. 4A): whitish yellow with ill-defined greyish yellow bands on the sides. Spinnerets grey–yellow. *Legs*: femora I slightly enlarged. Light yellow to whitish yellow. Ventral spination of legs I: metatarsi 2–2; tibiae 1–2–2–2–2; patellae 0. *Epigyne* (Fig. 4D): small and pale; vulva not examined.

Dimensions: total length 4·92 mm, carapace length 1·84 mm. *Ratios*: AM : AL : PM : PL: 8 : 4 : 1 : 4·5, AL–PM–PL: 6·5–6; a: 1·04, b: 1·05, c: 0·46, e: 0·80 (1 ♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. São Thomé.

MATERIAL EXAMINED. Lectotype ♀, data given in synonymy.

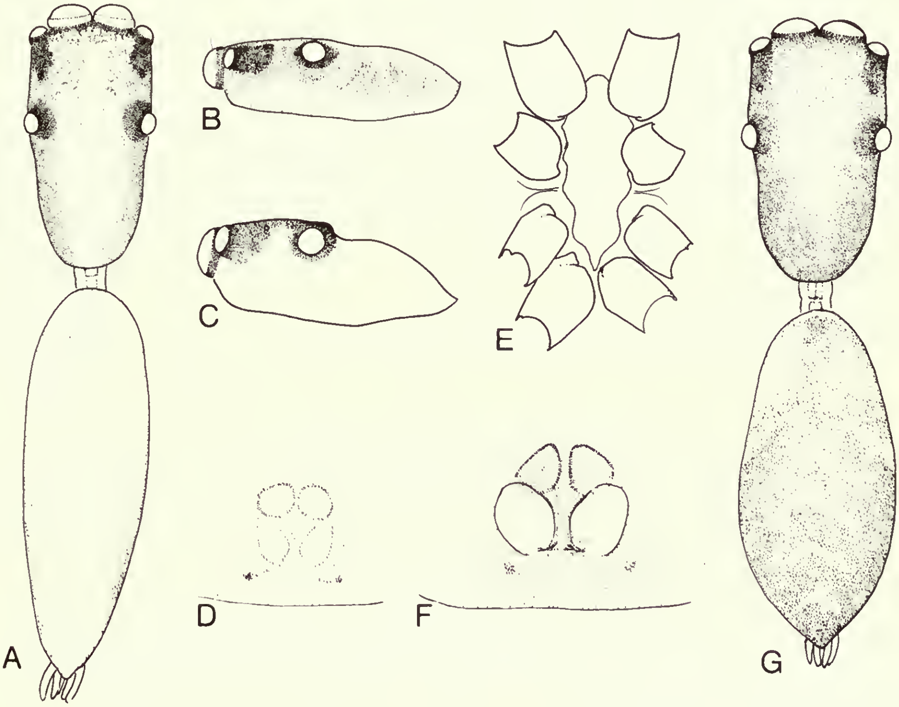

Fig. 4 (A, B, D) *Belippo anguina* Simon. Lectotype ♀: (A) dorsal view; (B) carapace, lateral view; (D) epigyne, ventral view. (C, E, F, G) *Belippo nexilis* (Simon). Lectotype ♀: (C) carapace, lateral view; (E) sternum; (F) epigyne, ventral view; (G) dorsal view.

Belippo nexilis (Simon) comb. nov.

(Fig. 4C, E–G)

Myrmarachne nexilis Simon, 1910 : 415, ♂♀. LECTOTYPE ♀ (here designated), São Thomé, Agua Izé and Ribeira Palma (MCSN, Genoa) [Examined]. Roewer, 1954 : 943. Bonnet, 1957 : 3010. Roewer, 1965 : 76. Prószyński, 1971b : 439.

When describing *M. nexilis*, Simon gave two localities in São Thomé, Agua Izé and Ribeira Palma, but did not specify the number of specimens. I have only been able to trace one female and

Fig. 3 Genitalia structure (schematic). (A, B, C) *Belippo*: (A) ♂ palp in ventral view; (B) ♀ epigyne in ventral view; (C) ♂ palp in retrolateral view. (D, E, F) *Myrmarachne*: (D) ♂ palp in ventral view; (E) ♀ epigyne in ventral view; (F) ♂ palp in retrolateral view. For explanation of abbreviations, see caption to fig. 1.

two male specimens labelled *M. nexilis*, in Simon's hand. The female bearing the locality label 'São Thomé, Igua Ize' is designated lectotype. The two males which were found together in the same vial with the locality label 'São Thomé' are not conspecific with the female or with each other but represent new taxa that are described elsewhere in this paper (see pp. 46, 88). However, one of the males (the specimen designated holotype of *Myrmarachne confusus* sp. n.) agrees more or less with Simon's original description of the male of *M. nexilis* particularly in respect of the club-shaped chelicerae and it is possible that this specimen is a paralectotype of *nexilis* in spite of the incomplete locality data.

DIAGNOSIS. *Belippo nexilis* is closely related to *B. anguina* Simon but it is easily distinguished by the more robust body form and lack of colour markings on the carapace (Fig. 4G).

MALE. Unknown but it is possible that *B. viettei* (Kraus) belongs with this species.

FEMALE. *Carapace* (Fig. 4C, G): eye region punctured-reticulate, thoracic part finely papillate; orange to reddish orange with dull metallic sheen on the head; sparsely covered with scattered white hairs. *Eyes*: anteriors subcontiguous with apices level, AM relatively large, fringed with fine brownish hairs. *Chelicerae*: orange, shiny; promargin with 5 teeth, retromargin with 6. *Maxillae and Labium*: orange but labial tip paler. *Sternum* (Fig. 4E): yellow-orange. *Abdomen* (Fig. 4G): greyish to orange-brown with ill-defined chevrons posteriorly and whitish band anteriorly. *Legs*: femora I slightly enlarged; light yellowish orange to brownish orange. Ventral spination of legs I: metatarsi 2–2; tibiae 1–2–2–2–2–2; patellae 0. *Epigyne* (Fig. 4F): small with openings evidently separated by median septum; vulva not examined.

Dimensions: total length 7·1 mm, carapace length 2·88 mm. *Ratios*: AM : AL : PM : PL: 14 : 8 : 1·5 : 8, AL–PM–PL: 10–8·5; a: 1·05, b: 1·6, c: 0·47, e: 0·93 (1♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. São Thomé.

MATERIAL EXAMINED. Lectotype ♀, data given in synonymy.

Belippo viettei (Kraus) comb. nov.

(Fig. 5A–G)

Myrmarachne viettei Kraus, 1960 : 97, figs 9–12, ♂. Holotype ♂, São Thomé, Diogo Vaz, Monte das Quinas (MNHN, Paris) [Examined]. Roewer, 1965 : 76, fig. 48.

DIAGNOSIS. *B. viettei* is a species of uncertain affinities. It could be the male of *B. nexilis* (Simon) and may be closest to *B. anguina* Simon, also known only from the female. It is separated from other male *Belippo* by the presence of an abdominal pattern (which may be more distinctive in fresh specimens), the absence of retrolateral spurs on the chelicerae (Fig. 5C) and relatively elongate palpal tibiae (Fig. 5E–G).

FEMALE. Unknown.

MALE. *Carapace* (Fig. 5A, B): finely punctured-reticulate in eye region with thoracic part finely papillate; orange-brown to light orange-brown. *Eyes*: anteriors contiguous with apices slightly procurved, sparsely fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 5C, D): finely rugulose; yellow-brown, shiny; lateral keels dark brown with distal prolateral spur; fang apophysis lacking. *Maxillae and Labium*: light orange-brown, labium a shade darker. *Sternum*: light yellow. *Abdomen* (Fig. 5A, B): mottled yellowish grey with ill-defined pattern of pale spots and chevrons. *Legs*: femora I enlarged; legs I yellowish with metatarsi and sides of tibiae brownish. Other legs light yellow-brown with some darkening on apices of tibiae and patellae IV. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 0. *Palp* (Fig. 5E–G): light yellow; tibiae relatively long with 3 slender denticles.

Dimensions: total length 4·5 mm, carapace length 1·8 mm. *Ratios*: AM : AL : PM : PL: 9 : 4·8 : 1·5 : 5·5, AL–PM–PL: 6·8–5·8; a: 1·05, b: 1·05, c: 0·48, d: 0·28, e: 0·83 (1♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. São Thomé.

MATERIAL EXAMINED. Holotype ♂, data given in synonymy.

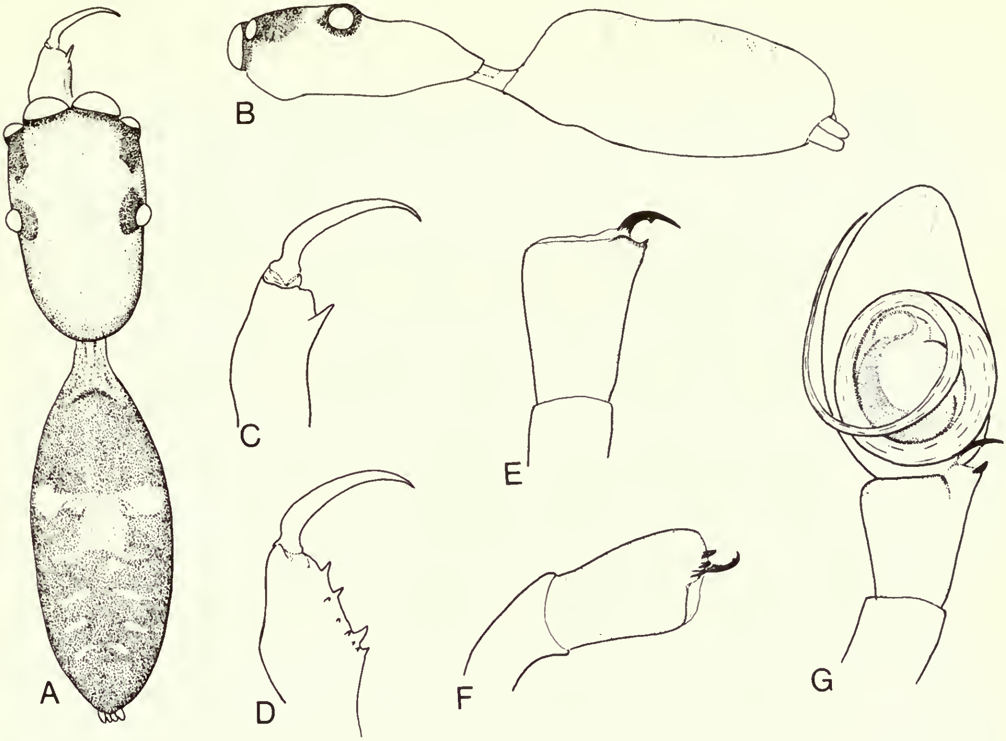

Fig. 5 *Belippo viettei* (Kraus). Holotype ♂: (A) dorsal view; (B) lateral view; (C) chelicera, dorsal view; (D) chelicera, ventral view; (E) palpal tibia, dorsal view; (F) palpal tibia, lateral view; (G) palp, ventral view.

Belippo calcarata (Roewer) comb. nov.

(Fig. 6A–L)

Myrmarachne calcarata Roewer, 1942 : 253, pl. 19, figs 9a, 9b, ♂. Holotype ♂, Fernando Po, Musola, 630 m (FS, Frankfurt am Main) [Examined]. Roewer, 1954 : 942; 1965 : 74, fig. 30. Prószyński, 1971b : 437.

DIAGNOSIS. *Belippo calcarata* is closely related to *B. milloti* (Lessert) but can be distinguished by the presence of rippling and papillae on the carapace and only one barb on the movable apophysis of the male palp (Fig. 6H, K, L).

MALE. *Carapace* (Fig. 6A, E, G): eye region punctured-reticulate with ripples between PL to finely, but densely papillate on thoracic part. *Eyes*: anteriors contiguous with apices slightly procurved, sparsely fringed with whitish hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Fig. 6B, C): finely rugulose; yellow-brown, shiny; lateral keels dark brown with retrolateral and distal prolateral spurs; fang apophysis lacking. Spurs somewhat reduced in smaller individuals. *Maxillae and Labium*: yellow-brown, labium sometimes darker. *Sternum* (Fig. 6D): yellow-brown or orange-brown shiny. *Abdomen* (Fig. 6A, G): yellowish mottled with black; scuta light orange-brown suffused with some black, rather glossy with fine scattered hairs and 2 impressed dots; a pale yellow haired band in constriction. *Legs*: femora I enlarged; legs I light yellow-brown with brownish metatarsi and dark brownish femora. Legs II–III pale yellow-brown with inside of femora II and outside of patellae and femora III blackish. Legs IV light yellow-brown with sooty marks on the sides of metatarsi, tibiae, patellae and femora. Ventral spination of legs I: metatarsi 2–2; tibiae 2–2–2–2 or 2–2–2–2–2; patellae 2 or 1. *Palp* (Fig. 6H, K, L): tibia with 3 or 4 denticles; embolus tip curved, sometimes scythe-like.

Dimensions: total length 2·88–3·30 mm; carapace length 1·37–1·60 mm. *Ratios*: AM : AL : PM : PL: 7 : 4 : 1 : 4, AL–PM–PL: 6–5; a: 1·04, b: 1·04–1·08, c: 0·47–0·50, d: 0·27–0·28, e: 0·77 (3♂ examined).

FEMALE (formerly undescribed). *Carapace* (Fig. 6F): anterior half of eye region finely rugulose, posterior half punctured-reticulate with ripples between PL; thoracic part as in ♂; orange-brown, shiny. *Eyes*: as in ♂. *Clypeus*: sparsely fringed with fine pale hairs. *Chelicerae*: finely rugulose; light yellowish, shiny; promargin with 4 teeth, retromargin with 7. *Maxillae and Labium*: light yellow. *Sternum*: light yellow. *Abdomen*: light yellowish. *Legs*: femora I enlarged. Generally

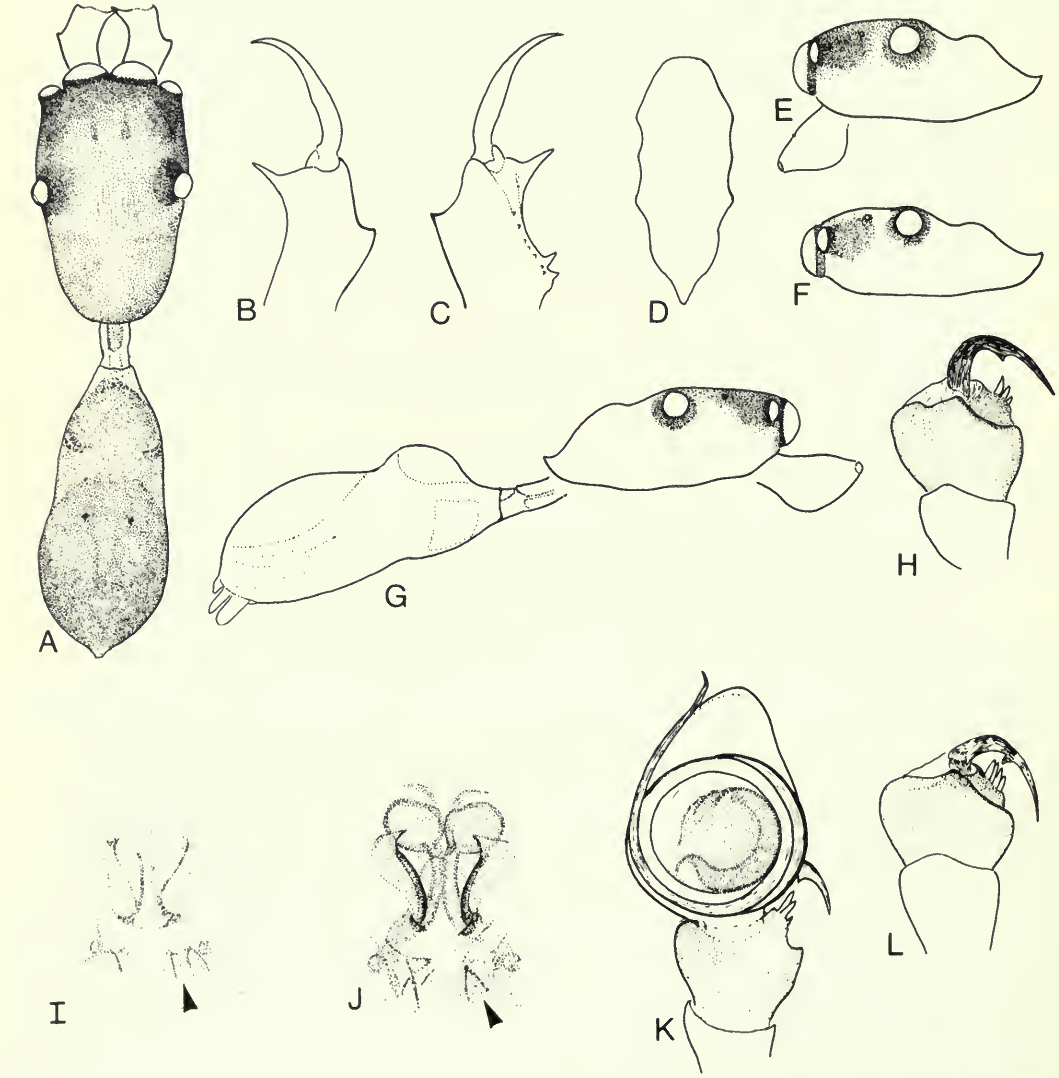

Fig. 6 *Belippo calcarata* (Roewer). Holotype ♂: (A) dorsal view; (B) chelicera, dorsal view; (C) chelicera, ventral view; (D) sternum; (G) lateral view; (H) palpal tibia, dorsal view; (K) palp, ventral view. ♂ from Angola: (E) carapace lateral view. ♀ from Angola: (F) carapace, lateral view; (I) epigyne, ventral view; (J) vulva, ventral view. ♂ from Zaire: (L) palpal tibia, dorsal view.

light yellowish to pale yellow-orange. Ventral spination of legs I: metatarsi 2–2; tibiae 2–2–2–2–2; patellae 2. *Epigyne* (Fig. 6I, J): rather pale with openings indistinct; secondary spermathecae forming somewhat angular amorphous masses.

Dimensions: total length 3·48 mm, carapace length 1·44 mm. *Ratios*: AM : AL : PM : PL: 8 : 4·5 : 1 : 4·5, AL–PM–PL: 5·5–4; a: 1·03, b: 1·08, c: 0·50, e: 0·78 (1 ♀ examined).

BIOLOGY. Professor Eidmann (Roewer, 1942) observes that this species when alive resembles *Pheidole* ants.

DISTRIBUTION. Angola, Fernando Po, Zaire.

MATERIAL EXAMINED. Holotype ♂, data given in synonymy. ANGOLA: Environs of Dundo, forest litter, R. Cambuacala, 1♂, 2.viii.1960 (*A. B. Machado*, Ang. 15903.2) (BMNH). Park Carrisso, in fallen rotting tree trunk, 1 ♀, 15/23.vi.1949 (*A. B. Machado*, DM. 1522.45) (BMNH). ZAIRE: Katanga, Mt Kabobo, Ht Kiymbi, 1700 m, 1♂, x.1958 (*N. Leleup*, MT 112760) (MRAC, Tervuren).

Belippo milloti (Lessert) comb. nov.

(Fig. 7A–M)

Myrmarachne milloti Lessert, 1942 : 8, figs 1–4, ♂♀. LECTOTYPE ♂ (here designated), Zaire, Kivu, Tschibuida (MRAC, Tervuren) [Examined]. Roewer, 1954 : 943; 1965 : 48, fig. 30. Prószyński, 1971b : 439.

DIAGNOSIS. *Belippo milloti* is closely related to *B. calcarata*, from which it may be distinguished by the absence of rippling and papillae on the carapace and the presence of a double barb on the movable apophysis of the male palp (Fig. 7M).

MALE. *Carapace* (Fig. 7A, B): eye region as far as constriction, punctured-reticulate; thoracic part finely sculptured, often poorly defined engraved reticulate; orange-brown, sometimes lighter in eye region; sparsely clothed with fine white hairs. *Eyes*: anteriors contiguous with apices procurved, fringed with whitish hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Fig. 7C, D, E): engraved reticulate; yellow-brown, shiny; lateral keels brown-black with retrolateral and distal prolateral spurs; fang apophysis lacking. *Maxillae and Labium*: yellow-brown, labium sometimes darker. *Sternum* (Fig. 7L): light yellow-brown tinged with black. *Abdomen* (Fig. 7A, B): yellow-brown mottled with black; scuta orange-brown tinged with some black; sparsely clothed with short, fine whitish hairs with a poorly defined white haired spot on either side of constriction. *Legs*: femora I enlarged. Legs I dark brown but tarsi, tibiae distally, patellae, trochanters and coxae yellow-brown. Other legs yellow-brown tinged with some black on the sides. Ventral spination of legs I: metatarsi 2–2; tibiae 2–2–2–2 or 2–2–2–2–2; patellae 1 or 2. *Palp* (Fig. 7F, H, I, M): barbs usually distinct but sometimes separated by only a slight depression; tibiae with 3 blunt denticles, rarely 4.

Dimensions: total length 4·72–4·56 mm, carapace length 1·64–2·0 mm. *Ratios*: AM : AL : PM : PL: 9·5 : 6 : 1·5 : 5; AL–PM–PL: 7–7; a: 1·02–1·06, b: 0·98–1·01, c: 0·48–0·50, d: 0·33–0·44, e: 0·73–0·75 (7♂ examined).

FEMALE. *Carapace* (Fig. 7G): sculpturing and colour as in ♂. *Eyes*: anteriors contiguous with apices slightly procurved, fringed with whitish hairs. *Clypeus*: very sparsely fringed with long whitish hairs. *Chelicerae*: rugulose; light orange-brown, shiny; promargin with 4 or 5 teeth, retromargin with 6 or 7. *Maxillae and Labium*: pale orange-brown, *Sternum*: light orange-brown. *Abdomen*: dull yellowish mottled with black, with ill-defined orange-brown scuta; sparsely clothed with short, fine brownish hairs. *Legs*: more or less as in ♂. *Epigyne* (Fig. 7J, K): sometimes obscured by waxy secretions; the appearance of the secondary spermathecae is inconsistent and the opening shows some variation.

Dimensions: total length 4·36–5·0 mm, carapace length 1·64–2·04 mm. *Ratios*: AM : AL : PM : PL: 9·5 : 6 : 1·5 : 5, AL–PM–PL: 7–7; a: 1·02–1·04, b: 1·03–1·08, c: 0·49–0·52, e: 0·72–0·84 (10 ♀ examined).

BIOLOGY. Unknown.

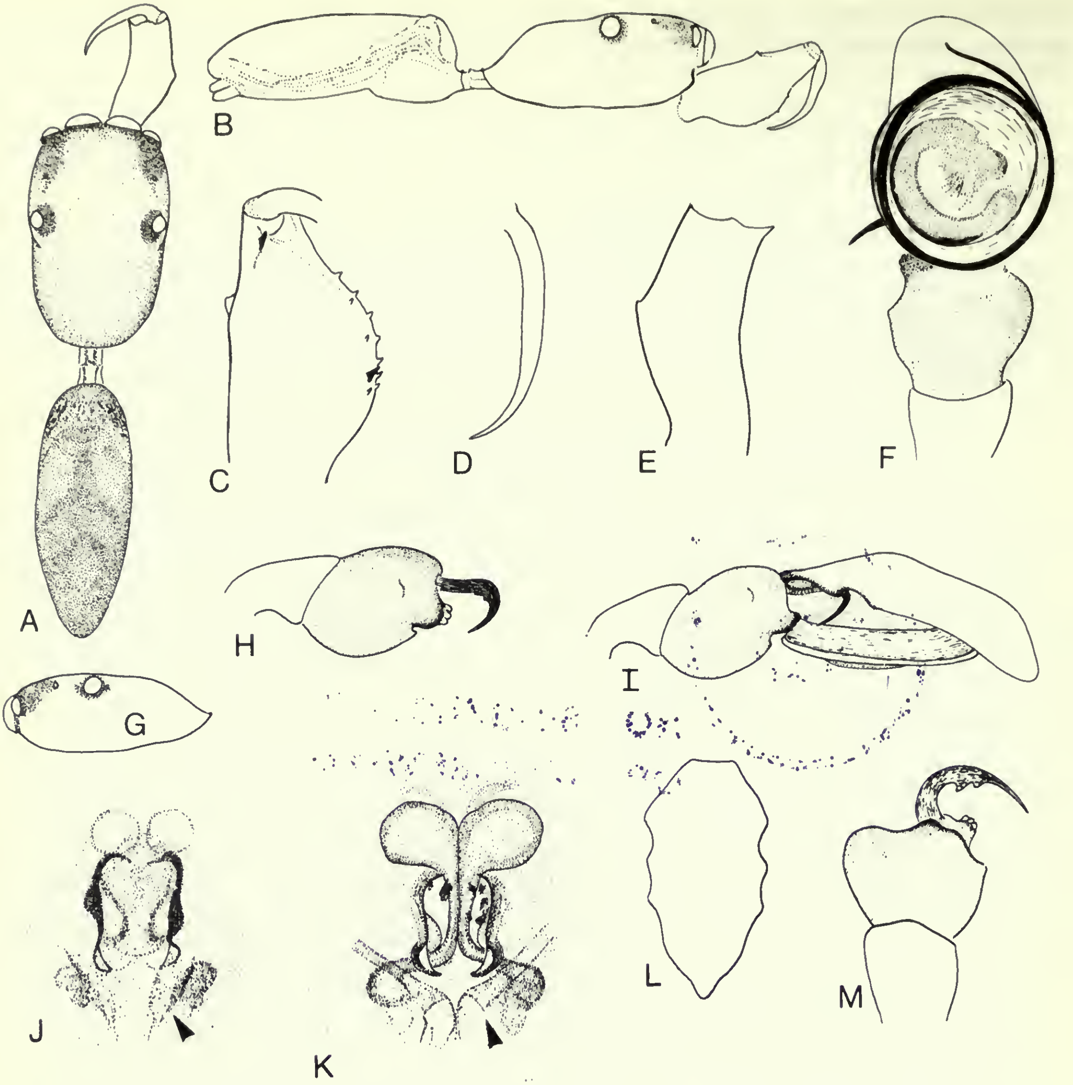

Fig. 7 *Belippo milloti* (Lessert). Lectotype ♂: (A) dorsal view; (B) lateral view; (C) chelicera, ventral view; (D) fang; (E) chelicera, dorsal view; (F) palp, ventral view; (H) palpal tibia, lateral view; (I) palp, lateral view; (L) sternum; (M) palpal tibia, dorsal view. ♀ from Zaire: (G) carapace, lateral view; (J) epigyne, ventral view; (K) vulva, ventral view.

DISTRIBUTION. Zaire.

MATERIAL EXAMINED. Lectotype ♂, data given in synonymy. Paralectotypes, 2♂, 4♀, data as for lectotype. ZAIRE: Kivu: Itombwe, Terr. Uvira, Poste Mulenge, Nyalengwe, 2300 m, in forest litter, 1♀, xi.1959 (*N. Leleup*, MT 114686); Itombwe, Terr. Uvira, 2700 m, litter in mountain forest with bamboo, 2♀, i.1960 (*N. Leleup*, B. 128); Itombwe, Terr. Mwenge, Lac Lungwe, litter in forest with bamboo, 1♂, viii.1953 (*N. Leleup*, MT 74873); Terr. Lubero, Cave Ribwe Lya Mikako, 1500 m, 1♂, 27.xii.1966 (*R. P. M. J. Celis*, MT 131344); Terr. Lubero, Kasuo, cave Kabwe-Ka-Ndongwe, 1450 m, 1♂, (*R. P. M. J. Celis*, MT 85488); Terr. Uvira, Haut Luvubu, 2750 m, 2♂, 1♀, v.1954 (*N. Leleup*, MT 78584–78587); Mt Lubwe, SE of Butembo, 2380 m, in mosses, 2♀, 13.iv.1971 (*R. P. M. Lejeune*, MT 138847); Itombwe, Terr. Uvira, Source of the Nyalengwe, 2500 m, litter in mountain forest with bamboo, 1♀, vii.1959 (*N. Leleup*, MT 114209); Terr. Kabare, Mushuere, in litter, 1♀, 2.xi.1954 (*N. Leleup*, MT 80754); Itombwe, Terr. Uvira, Source of the Mugono, 2700 m, 2♀, i.1960 (*N. Leleup*, B. 127a); Kambaila, valley Kalingolingo, 1♂, vi.1973 (*M. Lejeune*, MT 145.836); Itombwe, Terr. Uvira, Source of the Kokololo, litter in mountain forest with bamboo, 1♂, i.1960 (*N. Leleup*, B. 123); Mt Lubwe, SE of Butembo, 2400 m, in mosses, 1♀, 13.iv.1971 (*R. P. M. Lejeune*, MT 138856); Dorsale of Lubero, Mt Muleke, 2300 m, 1♂, 1.vii.1963 (*R. P. M. J. Celis*, MT 125346); Butembo, 1♀, vi.1971 (*R. P. M. Lejeune*, MT 140.873); Itombwe, Terr. Mwenga, Source of the Bukundji, 2250 m, 1♀, ii.1957 (*N. Leleup*, MT 91632); Terr. Masisi, region of lake Mokoto, 1800 m, in

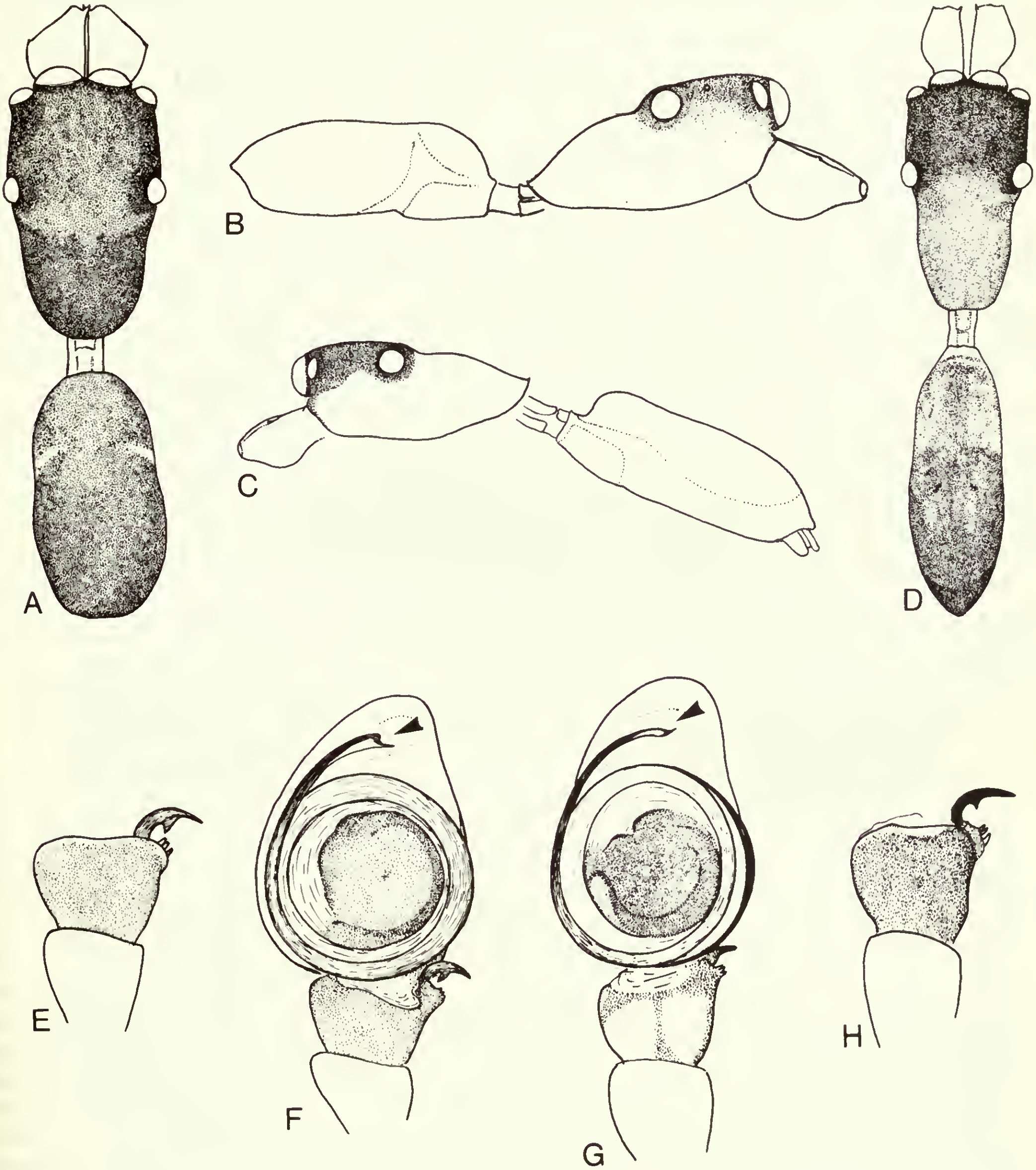

Fig. 8 (A, B, E, F) *Belippo cygniformis* sp. n. Holotype ♂: (A) dorsal view; (B) lateral view; (E) palpal tibia, dorsal view; (F) palp, ventral view. (C, D, G, H) *Belippo ibadan* sp. n. Holotype ♂: (C) lateral view; (D) dorsal view; (G) palp, ventral view; (H) palpal tibia, dorsal view.

forest litter, 1 ♀, vi.1959 (*N. Leleup*, MT 114003); Volcan Karisimbi Rweru, 2700 m, 1 ♀ (*R. P. M. Lejeune*, MT 138.479) (all MRAC, Tervuren) Kivu, Kahuzi, in litter, 1♂, 8.xi.1953 (*A. B. Machado*, Ang. 10413.8) (BMNH). Note: all of these records are from the high Kivu Mountains.

Belippo cygniformis sp. n.

(Figs 8A, B, E, F; 9H–J; Pl. 2c)

DIAGNOSIS. *Belippo cygniformis* shows very close affinities to *B. ibadan* sp. n. but may be distinguished by the more robust body form (Fig. 8A) and swan-like embolic tip (Fig. 8F).

FEMALE. Unknown.

MALE. *Carapace* (Fig. 8A, B): eye region rugulose behind AL to punctured-reticulate with ripples between PL; thoracic part very densely papillate; orange-black with scattered white hairs, stout on lower part of thorax but grading to fine dorsally. *Eyes*: anteriors contiguous with apices slightly procurved, fringed with white hairs. *Clypeus*: sparsely fringed with long, fine white hairs. *Chelicerae* (Fig. 9I, J): very finely rugulose; dark orange-brown, rather shiny; lateral keels blackish with minute prolateral and distal retrolateral spurs; fang apophysis lacking. *Maxillae*: orange. *Labium*: orange-brown. *Sternum* (Fig. 9H): orange. *Abdomen* (Fig. 8A, B): dull yellow mottled with black; dorsal scuta contiguous dark mahogany, clothed with whitish hairs; ventral scutum elongate, orange-brown. *Legs*: femora I enlarged. Legs I mahogany but tarsi, metatarsi distally, patellae, distal femora, trochanters and coxae yellow-brown. Legs II yellow-brown but with blackish streak along inside of femora. Legs III brownish with tarsi, tibiae and femora proximally yellow-brown. Legs IV as III but trochanters and coxae yellow-brown. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 2. *Palp* (Fig. 8E, F): tibiae with 3 short, blunt denticles; tibial apophysis with single barb; embolic tip swan-like.

Dimensions: total length 3·88–4·16 mm, carapace length 1·92–1·96 mm. *Ratios*: AM : AL : PM : PL: 10 : 6 : 1 : 6, AL–PM–PL: 8–5; a: 1·03–1·04, b: 1·04, c: 0·48–0·50, d: 0·37–0·38, e: 0·73–0·78 (3♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Ghana.

MATERIAL EXAMINED. Holotype ♂, GHANA: Kade, pyrethrum knockdown sample from the canopy of a plot of Amelonado cocoa, 13.vii.1971 (*J. D. Majer*) (BMNH, reg. no. 1977.4.21.31). Paratypes. GHANA: same locality and collector as holotype, 2♂, 1.xii.1971 (BMNH).

ETYMOLOGY. The specific name refers to the swan-like embolic tip.

Belippo ibadan sp. n.

(Figs 8C, D, G, H; 9A–G; Pls 1g; 2d)

DIAGNOSIS. *Belippo ibadan* is very closely related to *B. cygniformis* sp. n. Males are distinguished by the more slender body form (Fig. 8D) and the shape of the embolic tip (Fig. 8G). Females are characterized by the structure of the epigyne (Fig. 9C, D) and the densely papillate thorax (note female *cygniformis* are unknown).

MALE. *Carapace* (Fig. 8C, D; Pl. 2d): eye region rugulose to punctured-reticulate with ripples between PL, thoracic part moderately papillate (rather difficult to see); eye region blackish with thorax and sides orange-brown; very sparsely covered with fine, light brown hairs. *Eyes*: anteriors contiguous with apices procurved, fringed with whitish hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Fig. 9E, F): finely rugulose; dark brown with glistening reflections, lateral keels blackish with minute prolateral and distal retrolateral spurs; fang apophysis lacking. *Maxillae and Labium*: orange-brown. *Sternum* (Fig. 9G): yellow-orange with darker margins. *Abdomen* (Fig. 8C, D; Pl. 1g): dull yellow mottled with black; dorsal scuta contiguous, orange suffused with black, the posterior two-thirds dark mahogany; ventral scutum orange-brown; very sparsely covered with fine hairs. *Legs*: femora I enlarged. Legs I yellowish orange but tibiae distally and metatarsi proximally blackish, femora dark mahogany with distal part whitish yellow. Legs II pale yellowish orange. Legs III–IV pale yellowish orange with light greyish mottling except on tarsi. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 2. *Palp* (Fig. 8G, H): tibia with 3 small denticles; tibial apophysis with single barb; embolus slightly broadened distally with tip drawn to a point.

Dimensions: total length 4·4–4·48 mm, carapace length 1·96–2·08 mm. *Ratios*: AM : AL : PM : PL: 10 : 6 : 1·3 : 6, AL–PM–PL: 7·5–5·5; a: 1·02–1·03, b: 1·05–1·07, c: 0·45–0·46, d: 0·26–0·28, e: 0·74–0·77 (4♂ examined).

FEMALE. *Carapace* (Fig. 9A, B): eye region rugose with rippling between PL; thoracic part densely papillate; dark orange-brown, a shade lighter between PL and in constriction; very sparsely covered with fine white hairs on thorax (more or less rubbed in specimens at hand). *Eyes*: anteriors contiguous with apices slightly procurved, fringed with white hairs. *Clypeus* as in ♂. *Chelicerae*: finely rugulose; orange-brown; promargin with 4 teeth, retromargin with 7.

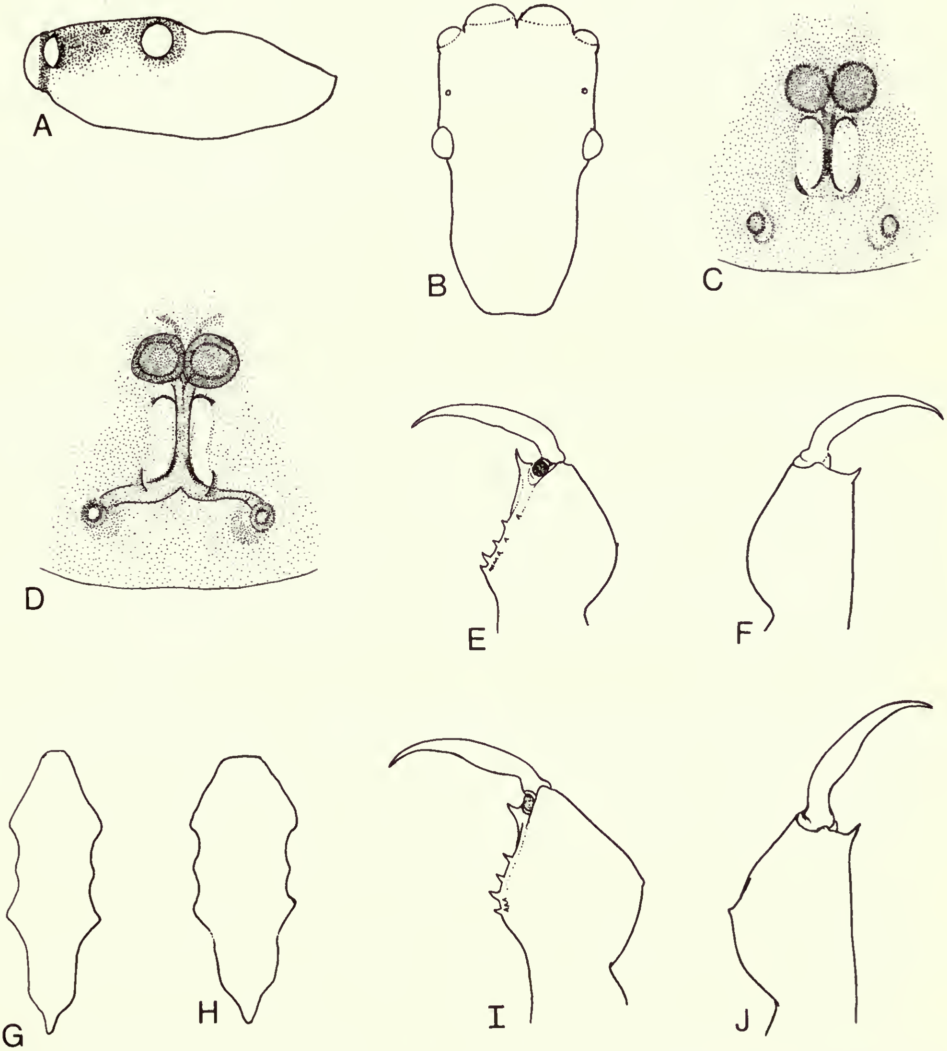

Fig. 9 (A–G) *Belippo ibadan* sp. n. Paratype ♀: (A) carapace lateral view; (B) dorsal view; (C) epigyne, ventral view; (D) vulva, ventral view. Holotype ♂: (E) chelicera, ventral view; (F) chelicera, dorsal view; (G) sternum. (H–J) *Belippo cygniformis* sp. n. Holotype ♂: (H) sternum; (I) chelicera, ventral view; (J) chelicera, dorsal view.

Maxillae and Labium: as in ♂. *Sternum*: light orange-brown. *Abdomen*: dull yellowish tinged with grey with ill-defined orange-brown scuta and 2 pairs of impressed dots; sparsely clothed with fine hairs with scanty white haired band in area of constriction. *Legs*: femora I enlarged. Legs I with tarsi and metatarsi distally yellow-brown; metatarsi proximally and tibiae dark brownish orange; patella orange-brown; femora orange-brown but with distal third, trochanters and coxae whitish yellow. Legs II yellow-brown with tarsi paler, coxae dark brownish orange and trochanters light yellowish. Legs III dark brown with tarsi light yellow brown. Legs IV as III but with tibiae distally and patellae proximally pale yellowish. Ventral spination as in ♂. *Epigyne* (Fig. 9C, D): opening sometimes clogged with waxy secretion; 'tail' of secondary spermathecae not always visible.

Dimensions: total length 4·90–5·48 mm, carapace length 2·24–2·28 mm. *Ratios*: AM : AL : PM : PL: 10 : 5·5 : 1·6 : 6, AL–PM–PL: 7–6; a: 1·02–1·04, b: 0·92–1·11, c: 0·46–0·48, e: 0·74–0·77 (4♀ examined).

BIOLOGY. Mr A. Russell-Smith found that this species was quite abundant on the ground in riverine woodland at the beginning of the wet season (March to May) where it was particularly conspicuous beneath bamboos, running about in litter with several species of ant, *Mesoponera ambigua* and *Anochetus bequaerti* in the Ponerinae and *Crematogaster depressa* in the Myrmicinae.

DISTRIBUTION. Nigeria.

MATERIAL EXAMINED. Holotype ♂, NIGERIA, Ibadan, International Institute of Tropical Agriculture, riverine woodland, 21.iv.1974 (*A. Russell-Smith*) (BMNH, reg. no. 1975.1.31.16). Paratypes. NIGERIA: same data as holotype, 1♂, 1♀ (BMNH); same locality and collector as holotype, 2♂, 2♀, 23.iii.1974; 1♀, 5.v.1974 (BMNH).

ETYMOLOGY. The specific name is a noun in apposition taken from the type-locality.

Genus *MYRMARACHNE* Macleay

Myrmarachne Macleay, 1838 : 10. Type-species *Myrmarachne melanocephala* Macleay, by monotypy. Simon, 1901 : 504. Roewer, 1954 : 950. Bonnet, 1957 : 2997. Roewer, 1965 : 33. Galiano, 1969 : 107.

Hermosa Peckham & Peckham, 1892 : 53. Type-species *Hermosa volatilis* Peckham & Peckham, by monotypy. [Synonymized by Simon, 1901 : 504.] Bonnet, 1957 : 3014. Roewer, 1965 : 64.

Iola Peckham & Peckham, 1892 : 75. Type-species *Iola cowanii* Peckham & Peckham, by monotypy. [Synonymized by Simon 1901 : 504.] Bonnet, 1957 : 2298. Roewer, 1965 : 65.

Bizone Simon, 1903 : 1050. Type-species *Bizone longiventris* Simon, by original designation. [Junior homonym of *Bizone* Walker, 1854.] Bonnet, 1957 : 887. Roewer, 1965 : 79.

Bizonella Strand, 1929 : 15. [Replacement name for *Bizone* Simon non Walker.] Bonnet, 1957 : 887. Roewer, 1965 : 79. **Syn. n.**

The problems of classification in the Salticidae have been discussed by Petrunkevitch (1928), Prószyński (1971a, 1971c) and Jackowska & Prószyński (1975). In the system proposed by Simon (1901) and modified by Petrunkevitch (1928) the Salticidae are grouped in 22 subfamilies, some of which include ant-like genera. *Myrmarachne* is the type-genus of the subfamily Myrmarachninae but Prószyński (1971a) has suggested that all ant-like Salticidae should be placed in one subfamily, the Synemosyninae Banks, on the grounds that all, or at least the majority, of ant-like salticid genera are of monophyletic origin. Selection for ant mimicry results in convergence and specialization; the possession of ant-like characters does not necessarily indicate a phylogenetic relationship. Ant mimicry is fairly common in spiders and has arisen many times, at least four times in the Clubionidae and several times in the Theridiidae, Araneidae and Thomisidae and also in the Gnaphosidae, Zodariidae and Eresidae (Reiskind & Levi, 1967). The Salticidae are no exception although the relationship between ant-like and non ant-like genera is poorly known. Ant-like forms may have evolved at least three or four times in Africa alone, since the genera *Myrmarachne*, *Enoplomischus*, *Cosmophasis* and *Belippo* each appear to represent monophyletic groups. *Cosmophasis* species are behavioural ant-mimics and Simon (1901) has in my view correctly placed this genus in his suprageneric group Chrysilleae, which includes mimetic and non mimetic genera that show affinities in the structure of the genitalia.

DEFINITION. Ant-like spiders ranging from about 3·0 to 9·0 mm in length. Males sexually dimorphic. *Carapace*: shape variable, usually constricted with lateral wedge-shaped patches of whitish hairs and one or two pairs of dorsal trichobothria; sculpturing variable; colour patterns usually lacking, rarely hirsute. *Eyes*: anterior row subcontiguous or contiguous with apices procurved or level in frontal view; middle row midway or nearly midway between anterior lateral and posterior lateral eyes; posterior row equal to or wider than anterior row; quadrangle length between 27 and 44 per cent of carapace length. *Clypeus*: very low. *Female chelicerae*: normal with 4–7 promarginal and 5–8 retromarginal teeth. *Male chelicerae*: strongly developed, usually elongate and more or less horizontal; spurs present or absent; fang usually sinuous, apophysis present or absent; teeth usually numerous, rarely lacking on retromargin. *Maxillae*: elongate, subparallel or slightly divergent. *Labium*: elongate, rarely with median keel. *Sternum*: shape variable, usually elongate, sometimes very narrow. *Pedicel*: elongate, segments usually subequal. *Abdomen*: shape variable, constriction present or absent, sometimes reinforced with scanty band of hairs; scuta present in males, lacking or vestigial in females. *Legs*: usually slender, femora I sometimes dorsoventrally enlarged and slightly compressed laterally; formula 4132; spination: lateral spines absent; dorsal spines sometimes present on femora; ventral spines present on legs I and II but usually absent on legs III and IV; claw tufts present but scopula lacking. *Female palp*: palette-shaped, fringed with preening setae. *Male palp* (Fig. 3D, F): tibial apophysis with or without hook; flange present or absent; embolus long and slender with two turns around tegulum, rarely distally filamentous; tegulum subcircular with small to large seminal reservoir; pars pendula present but conductor and median apophysis lacking; cymbium with proximal ectal margin sometimes protuberant or depressed with setae. *Epigyne* (Fig. 3E): comparatively simple with indistinct openings separated by ill-defined septum; paired lateral pouches or median subtriangular pouch present; spermathecae simple, looped or twisted, rarely coiled, not distinctly separated from proximal seminal ducts; distal seminal ducts usually indistinct, sometimes broad and obscurely convoluted, rarely spiralled.

DIAGNOSIS. *Myrmarachne* is separated from *Belippo* by the absence of a movable tibial apophysis on the male palp and lack of secondary spermathecae in females. As with *Belippo* a fuller diagnosis cannot be given until related genera have been revised.

SPECIES GROUPS. The genus *Myrmarachne* includes, at present, 58 species in the Ethiopian region which are arranged here in species groups or treated as species sola, i.e. species which cannot at the present time be attributed to any of the species groups. The use of species groups is particularly useful when they are based on the fauna of a restricted region as is the case here but it is not suggested that they are entirely natural as the larger groups may have been affected by parallel evolution. Clearly the status of the groups will have to be revised when the large and important oriental fauna is studied.

The groups are based mainly on genitalic characters. In the male they are: the form of the tibial apophysis, the presence or absence of a hook; the presence or absence of a flange; the presence or absence of depressions or protuberances on the proximal ectal margin of the cymbium; the form of the embolus and seminal reservoir in the tegulum. In the female: the presence of a median or paired lateral pouches, the form of the spermathecae and the nature of the distal seminal ducts. The presence of a distal lobe on the lower margin of some male chelicerae is the only non-genitalic character which comes into consideration.

Two groups are known only in one sex. Males of the African *lesserti*-group have distinctive palps with an unusually long apophysis and pronounced flange. Females of the Madagascan *nubilis*-group have distinctive epigynes with unusually coiled spermathecae and poorly defined distal seminal ducts. The two groups are not closely related but it is likely that one or two of the Madagascan males treated as species sola may belong in the *nubilis*-group.

In the *electrica*-group from Madagascar the long filamentous embolus of the male palp and coiled distal seminal ducts in the epigyne are possibly primitive, plesiomorphic forms. The group includes some rather different looking species one of which, *M. eugenei* nom. n., was originally described in *Emertonius*.

The *volatilis*-group found in Africa and Madagascar also includes some peculiar looking species and one of them, *M. longiventris* (Simon), is the type of the genus *Bizone*. Males are characterized by a distal lobe on the lower margin of the chelicerae and a large seminal reservoir in the tegulum. Females have a median pouch and very simple spermathecae. In body form the group shows some resemblance to *Belippo*.

There seems to be a general correlation between the development of pouches in females (i.e. single median or paired lateral) and the form of the tibial apophysis in males. Females of the large African *tristis*-group have paired lateral pouches and males a hooked tibial apophysis which is protected by a fringed depression in the cymbium. On the other hand, the smaller, mainly African *formicaria*-group is characterized by a median pouch in females but in males the tibial apophysis is not hooked and the fringed proximal depression is lacking or very poorly developed. It is evident that the *tristis* and *formicaria*-groups are closely related as they appear to be linked by several intermediate species (e.g. *M. eidmani* Roewer, *M. giltayi* Roewer, *M. luachimo* sp. n., *M. mussungue* sp. n. and *M. natalica* Lessert). In females, the lateral pouches are more or less contiguous and positioned medially; in males, the tibial apophysis is not hooked but the proximal depression is retained. Provisional studies show that the *tristis* and *formicaria*-groups are represented in the Palaearctic and Oriental regions and suggest that it may still be useful to retain these groups in a wider context.

Of more interest is the occurrence of the *volatilis*-group in the Oriental and Australasian regions and its affinities with the Neotropical fauna. In general, the known South American species could be arranged in two groups, if based on the male genitalia, but form one group if based on the female. The epigyne structures (Galiano, 1969, 1974) are very similar to those in the *volatilis*-group but the male palps are somewhat different and do not fall within the present concept of the *volatilis*-group. However, it would be premature to reach any firm conclusions at the present time until the Oriental and Australasian fauna is better known.

VARIATION. Madagascan species are usually more easily identified than African because the genitalia are more diverse and distinct. Most African species belong to the *tristis* and *formicaria*-groups which are characterized by the rather homogeneous genitalia. Females of both groups can be difficult to determine as the epigynes are often poorly defined and variable in appearance. In some cases it may be difficult to decide if the epigyne has median or paired lateral pouches. The median pouch is often pale but can normally be recognized with a good dissecting microscope. The lateral pouches can also be difficult to distinguish and in some cases it may be necessary to prepare temporary lactic-acid mounts for examination with the compound microscope. Unfortunately there are apparently no other characters which can be used to place females in their appropriate groups and circumstances will occur in which females cannot be identified in the absence of males.

O. Pickard-Cambridge (1869) was probably the first to draw attention to the wide variations in size and colour of *M. plataleoides* in Ceylon. Peckham & Peckham (1892) quoted O. Pickard-Cambridge but Szombathy (1913) figured several forms of *M. plataleoides* in an important paper that seems to have been overlooked by later workers. The failure to recognize such variants has resulted in numerous synonyms and caused many difficulties during this study. The realization that leg spination and cheliceral dentation showed intraspecific variation and that carapace shape, eye position and cheliceral form and length were allometric growth characters has substantially altered the species concept in *Myrmarachne*. In some cases (e.g. *M. elongata*, Figs 25, 26) extreme size variation would appear to be continuous but in others (e.g. *M. ichneumon* Simon Fig. 31A, B) intermediate forms are lacking. However, the occurrence of polytypic species can only be determined when adequate samples have been investigated and the discontinuities in collecting have been eliminated.

M. plataleoides, *M. foenisex* Simon and *M. kiboschensis* Lessert all show distinct colour differences in life but in the majority of species colour variation is only known from preserved specimens. The effect of postmortem changes is sometimes considerable and it may well be the case that many *Myrmarachne* are blackish in life and that the predominantly yellow-brown colour of preserved specimens is due to the loss of black pigment, a factor which must be taken into account when identifying fresh material. Similarly, preservation may result in bloated or shrunken abdomens considerably altering the general appearance of the specimen.

The problems that arise from intraspecific variation are by no means unique to *Myrmarachne* and the effects of postmortem changes might well apply to any spider but in *Myrmarachne* both have caused much difficulty since the structure of the genitalia cannot always be relied upon to separate the species. Obviously the genitalia are of prime importance but within the species groups they are homogeneous and can be intraspecifically variable. Differences in the form of the tibial apophysis, the relative size of the palpal tibia and spermathecae configuration can be difficult to interpret in the absence of a good series of specimens. Each species has to be considered in the context of all its attributes but even so it is inevitable that intermediates will occur and some apparently good species may eventually have to be placed in synonymy.

BIOLOGY. Although a few elongate, slender forms of *Myrmarachne* could be mistaken for reed or stem mimics (e.g. *M. foreli* Lessert), the majority of species are ant-like in appearance and are considered to be ant mimics in spite of the fact that the majority of species have no known models. The range of ant mimicry shown by *Myrmarachne* varies from species-specific to generalized (i.e. no single species of model can be designated). At present only two distinctive species of *Myrmarachne* can be properly described as specific ant mimics. *M. plataleoides* (O. P.-Cambridge) mimics the Indian weaver ant *Oecophylla smaragdina* (Fabr.) and *M. foenisex* Simon mimics the African weaver ant *O. longinoda* (Lat.). The ants are closely related but *M. plataleoides* does not apparently show any marked affinities with Ethiopian *Myrmarchne* and similarities with *M. foenisex* are probably the result of convergence. Several other *Myrmarachne* (e.g. *M. collarti* Roewer, *M. elongata* Szombathy and *M. foreli*) have been associated with specific ants but it is not known for certain that the ants represent specific models. Unfortunately, most species of *Myrmarachne* are not distinctive and models cannot be casually associated in the field especially where isopatric species are concerned. Most generalized mimics are therefore species which are poorly known and those which have been collected with several species of ant. Some of these generalized mimics will eventually qualify as specific mimics but most will probably prove to be mimics of ants at a generic level or even ants of a particular size range and colour. A list of the spiders, *Belippo* and *Myrmarachne*, and associated ants is given below. The list is believed to be complete for the Ethiopian region and for the Oriental species *M. plataleoides*.

Table 1 List of mimics and their models or potential models

Belippo calcarata	*Pheidole* sp.
B. ibadan	*Mesoponera ambigua*; *Anochetus bequaerti*; *Crematogaster depressa*
Myrmarachne collarti	*Odontomachus troglodytes*
M. elongata	*Tetraponera anthracina*
M. dundoensis	*Camponotus* sp.
M. foenisex	*Oecophylla longinoda*
M. foreli	*Tetraponera natalensis*
M. inflatipalpis	*Crematogaster* sp.
M. insulana	*Tetramorium* sp.
M. kiboschensis	*Camponotus* sp., *vetitus*-group; *Odontomachus troglodytes*
M. legon	*Camponotus acvapimensis*; *Crematogaster* sp.
M. marshalli	*Camponotus* spp.
M. nigeriensis	*Camponotus* sp.
M. plataleoides	*Anoplolepsis longipes*; *Oecophylla longinoda*; *Plagiolepsis* sp.; *Prenolepis* sp.; *Solenopsis* sp.; *Solenopsis geminata*
M. uvira	*Camponotus sericeus*

Myrmarachne resemble ants in body form, the carapace is usually constricted and joined to the abdomen by a distinct waist, the pedicel. In many cases the constriction is apparently deepened by a wedge-shaped band of whitish hairs on each side. Most species are cryptically coloured and dark hues are prominent. The degree of morphological similarity between *Myrmarachne* and its models is close and would appear to equal that found in other ant-like spiders, particularly in the Clubionidae. The resemblance, however, is not perfect for the best morphological ant mimics are to be found in the Insecta especially amongst the mirid bugs.

Most species are active during the day and are found in association with ants; sometimes several species of ant and *Myrmarachne* can be found in the same habitat. The characteristic behaviour of ants is successfully mimicked by *Myrmarachne* and the movements and postures are copied to a remarkable degree. The position and movement of the first pair of legs mimic an ant's antennae and a number of species will reflex the abdomen and assume a defensive posture when alarmed. Behavioural mimicry has been developed even further by *M. foenisex* which is reported to tend coccids and imbibe the honey-dew (Collart, 1929a, 1929b).

Some species are arboreal (e.g. *M. foenisex* and *M. plataleoides*) but the majority are probably terrestrial and live in litter and the lower vegetation zones. At rest or during periods of inactivity, *Myrmarachne* (like other non ant-like salticids) remain in silken retreats and are safe from the foraging activities of ants. However, the behaviour patterns of *Myrmarachne* do not apparently deceive the ants for *M. plataleoides* (Mathew, 1954) and *M. foenisex* (Collart, 1929a, 1929b) are very careful to avoid direct contact with the ants which will normally attack if the opportunity arises. Edmunds (1974) reports an instance when *O. longinoda* was found eating the eggs of *M. foenisex* whilst the spiders waited a few centimetres away and made no attempt to defend them. On the other hand, Marson & Carpenter (1946) and Marson (1947) report that males of *M. plataleoides* will chase away *O. smaragdina*.

Most *Myrmarachne* are probably Batesian mimics since the so-called innocuous spider gains protection by its likeness to a pugnacious model, the ant; however, no *Myrmarachne* is known to fulfil all the requirements for Batesian mimicry listed by Rettenmeyer (1970). The field observations of Marson & Carpenter (1946), Mathew (1954) and Edmunds (1974) suggest that *Myrmarachne* are not aggressive mimics and do not feed on their models, although Hingston (1927) reports an unnamed *Myrmarachne* stalking ants. The food preferences of *Myrmarachne* are not well known but *M. plataleoides* will feed on small Diptera and Hemiptera (Bhattacharya, 1939; Marson, 1946), and ant larvae (Mathew, 1954). Collart (1941) and Mathew (1954) have reported the occurrence of *Myrmarachne* in the active nests of *Oecophylla* but both authors were convinced that this happened only under certain conditions. However, subsequent reports (Mr B. Bolton, Ms J. Lee and Dr A. B. Machado, unpublished observations) suggest that *M. foenisex* often occurs in active nests and regularly feeds on ant larvae. Even Mathew (1954) reports that his attempts to rear spiderlings of *M. plataleoides* on an exclusive diet of ant larvae were 'quite a success and it is especially noteworthy that the specimens continued to be healthy and vigorous through all stages'.

Courtship of *M. plataleoides* has been described by Mathew (1940). In the natural state males do not indulge in courtship dances but pair with the female inside her nest. If the female is subadult the male will wait outside the chamber and pair when the female has moulted. In captivity the male will court the female but the preliminary movements are the same as those made by the male when he comes across any stranger. In *M. foenisex* (Collart, 1941) and *M. legon* sp. n. (M J. L. Ledroux, pers. comm.) there is apparently no courtship before pairing but males of *M. uvira* sp. n. and *M. kiboschensis* will perform courtship dances in captivity and posture in the presence of other *Myrmarachne* and occasionally in the absence of any apparent stimulus (Wanless, unpublished observations). Males would appear to mate several times and the females accept several mates.

Myrmarachne lays on average 20–25 eggs which are guarded by the female. They are usually laid in two batches so that developing eggs and embryos may be found in the same cocoon. Cocoons normally occur singly but in *M. plataleoides* several are sometimes aggregated on a single leaf (Mathew, 1954). Collart (1929a) also reports gregarious behaviour in female *M. foenisex* at the time of egg-laying. According to Mathew (1954) the eggs of *M. plataleoides* hatch in about a week; the spiderlings mature after six moults and mimic several species of ant during their development. The embryos break free of the chorion, moult twice within the cocoon (i.e. first and second instars) but do not feed. The spiderlings leave the nest as second instars; they are elongate, ant-like in form and movement and resemble dark brown (*Prenolepis*) and to a lesser extent small black Dolichoderinae ants. Third instars are variable in colour, some retain the dark coloration of the previous stage while others are reddish yellow, the posterior half of the abdomen alone retaining the dark colour and as such closely resemble small stinging (*Solenopsis*) ants. Fourth instars show a tendency to become light in colour and resemble *Plagiolepis* ants. Fifth instars mimic *Oecophylla*. Sixth instars achieve adult form and the male is distinguished by the horizontally extended chelicerae.

In a less detailed account, Bhattacharya (1939) reports that *M. plataleoides* lays 8–12 eggs and reaches maturity in six moults (i.e. eight if one includes two moults in the cocoon, not counted by Bhattacharya) and mimics *Solenopsis geminata* (Fabr.) and *Anoplolepsis longipes* (Jerd.) during its development.

The phenomenon of transformational mimicry has not been described in other *Myrmarachne* but it has been demonstrated in *Castianeira rica* Reiskind, a clubionid ant-mimic. Reiskind (1970) has shown by comparison with a congeneric, non-mimetic control species that multiple mimetic forms of *C. rica* were the result of (i) sexual dimorphism, (ii) colour variation in the adult female and (iii) development changes in the preadult instars. The multiple mimicry in *C. rica* contains at least five forms: two from sexual dimorphism, one from colour variation in the female and at least two or more from transformational mimicry (i.e. *C. rica* instars II and III mimic small myrmicine ants; instars IV and V resemble medium-sized attine ants). In *Myrmarachne* sexual dimorphism is always present and transformational mimicry may well occur in the majority of species. In some species (e.g. *M. plataleoides*, *M. foenisex* and *M. marshalli*) intraspecific variation particularly in the male may account for several mimetic forms.

By mimicking ants *Myrmarachne* gain protection from many spider predators and probably avoid many ant predators by their habit of running away when alarmed (Mathew, 1934), but it has yet to be demonstrated that mimicry has resulted in the lowering of the fecundity rate as suggested by Peckham (1889) for North American ant-like salticids. Edmunds (1974) has shown that *Myrmarachne* does in fact gain some protection from hunting wasps. Many wasps prey on spiders to provide food for their larvae. Most belong in the families Pompilidae and Sphecidae. All pompilids attack spiders and provide a single spider for each larva. In the Sphecidae there are only three groups which attack spiders. The Miscophini in the Larrinae are similar to pompilids in that they are single provisioners but *Sceliphron*, *Hemichalybion*, *Pison* and *Trypoxylon* in the Trypoxyloninae are multiple provisioners and build cells which are often crammed with spiders. The destruction of spiders by these wasps has been graphically described by Peckham & Peckham (1895) (quoted by Pocock, 1909) and it is evident that hunting wasps must be regarded as a major predator and possibly as a selective agent for ant mimicry, as none of the above sphecids or pompilids are known to attack ants. The majority of *Myrmarachne* which have been found in wasp nests were taken by *Pison* or *Trypoxylon* wasps. A nest of *Trypoxylon placidum* Cameron from Malaya contained 10 *Myrmarachne* of various species, 4 other salticids and 3 other spiders (Richards, 1947). Two *Pison* cells from Ghana contained 1 male (*M. richardsi* sp. n.), 6 females of *M. legon* sp. n., 20 immature *Myrmarachne* and 14 other juvenile Salticidae. The predatory behaviour of sphecid wasps has been studied by Dr M. Edmunds (unpublished data) and preliminary results show that immatures and female *M. elongata* Szombathy are heavily preyed upon and are found in the majority of nests. Other salticid genera also attacked by wasps include *Pseudicus*, *Telamonia* and *Cosmophasis*. It is of interest to note that *Cosmophasis* is a genus of behavioural ant-mimics which feeds on ants (Wanless, unpublished data) and is one of the few cases of aggressive mimicry known in the Salticidae.

Distribution in the Ethiopian region. At present the African fauna is represented by 44 species and includes the *tristis* and *lesserti*-groups, most of the *formicaria*-group and part of the *volatilis*-group. Madagascar is represented by 14 endemics which include the *nubilis* and *electrica*-groups, 6 species *Sola*, part of the *volatilis*-group and one member of the *formicaria*-group. *Myrmarachne* also occurs on São Thomé and Fernando Po but is apparently absent from Aldabra, the Comoro and Mascarene Islands. The Seychelles are represented by *M. constricta* (Blackwall) and several other ant-like salticids which will be described elsewhere.

Key to species of *Myrmarachne* in the Ethiopian Region

Males

1 Pedicel exceedingly long, anterior segments nearly 10 times length of posterior one (Fig. 73A).
(Madagascar) . . . . ***eumenes*** (Simon) (p. 114)

– Pedicel otherwise . . . 2

2 Labium with well-developed median keel (Fig. 84D). (Madagascar) . . . 3

– Median keel lacking or very rarely weakly developed . . . 4

3 Flange strongly developed, fringed with long setae (Fig. 82C–E) ***simplexella*** Peckham & Peckham (p. 121)

– Flange very weakly developed, fringed with short setae (Fig. 84E) . . . ***diegoensis*** sp. n. (p. 125)

4 Chelicerae with paired prolateral spurs (Fig. 70C); flange reduced to small lobe (Fig. 70F). (Madagascar) . . . ***augusta*** Peckham & Peckham (p. 109)

– Chelicerae and flange otherwise . . . 5

5 Embolus distally thread-like (Figs 76A; 78E, B; 80A); cymbium more bulbous distally (Figs 76D; 78B; 80B). (Madagascar) . . . 6

– Embolus distally slender, cymbium less bulbous distally . . . 8

6 Thoracic part irregularly tumulose (Pl. 2e, f) with a precipitous slope (Fig. 75F) ***eugenei*** nom. n. (p. 115)

– Thoracic part otherwise . . . 7

7 Seminal reservoir proximal and procurved, embolus with 3 turns around tegulum (Fig. 78E) ***electrica*** Peckham & Peckham (p. 118)

– Seminal reservoir distal and recurved, embolus with 2 turns (Fig. 80A) ***peckhami*** Roewer (p. 119)

8 Proximal ectal margin of cymbium protuberant, tibial apophysis long with flange arising from ventral margin (Fig. 69A–D). (South Africa) . . . 9

– Not with the combination of characters given above . . . 10

9 Chelicerae with retrolateral spurs (Figs 68A; 69E); embolus slender (Fig. 69A) ***lesserti*** Lawrence (p. 106)

– Retrolateral spurs lacking; embolus distally broad, tapering to fine point (Fig. 69D) ***albosetosa*** sp. n. (p. 108)

10 Chelicerae club-shaped (Figs 17A; 23A; 24A) . . . 11

– Chelicerae otherwise . . . 13

11 Tibial apophysis hooked (Fig. 23F; 24B) . . . 12

– Tibial apophysis sigmoid (Fig. 17B) . . . ***eidmani*** Roewer (p. 39)

12 Flange large in lateral view (Fig. 23F). (Angola, São Thomé) . . . ***confusus*** sp. n. (p. 46)

– Flange small in lateral view (Fig. 24B). (Uganda, Zaire) . . . ***collarti*** Roewer (p. 49)

13 Tibial apophysis hooked (Figs 11G; 22D–G; 28B; 35F) . . . 14

– Tibial apophysis otherwise (Figs 15F, G, H; 45F; 47B–D; 60A, B) . . . 29

14 Body form as in Fig. 33A, F. (West and Central Africa) . . . ***foenisex*** Simon (p. 60)

– Body form otherwise . . . 15

15 Carapace as in Fig. 35A, G, thoracic part long. (Ghana) . . . ***richardsi*** sp. n. (p. 61)

– Carapace and thoracic part otherwise . . . 16

16 Thorax fawnish red with brown submarginal bands on the sides (Fig. 30A). (Senegal) ***rufisquei*** Berland & Millot (p. 55)

– Thorax otherwise . . . 17

17 Abdomen slender, elongate with little white haired tufts in shallow constriction (Fig. 20B, C); tibial apophysis and flange well developed (Fig. 22E, G). (Kenya) . . . ***naro*** sp. n. (p. 43)

– Not with combination of characters given above . . . 18

18 Abdomen very long and slender (Fig. 20A, D, E); flange of tibial apophysis set medially on tibia (Fig. 22A, C) . . . 19

– Not with combination of characters given above . . . 20

19 Flange large in lateral view (Fig. 22F). (Ivory Coast, Ghana) . . . ***hesperia*** (Simon) (p. 46)

– Flange small in lateral view (Fig. 22D). (Zaire) . . . ***evidens*** Roewer (p. 42)

20 More robust species with heavy chelicerae, widest medially (Figs 10A; 12A); flange broadly produced, partly obscuring small tibial apophysis (Fig. 11A–C, E, F). (West, Central and East Africa) . . . ***militaris*** Szombathy (p. 30)

– Not with combination of characters given above . . . 21

21 More slender species with elongate abdomens (Figs 25A–F; 29A; 31A, B); tibia plus patellae IV to carapace length equal to or less than 0·74. . . . 22

– More robust species with less elongate abdomens (Figs 10B; 36A; 38A; 41A–C); tibia plus patellae IV to carapace length equal to or more than 0·76 . . . 24

22 Orange species (Fig. 31A, B); abdomen usually with ventral scutum. (East and Southern Africa) ***ichneumon*** (Simon) (p. 56)

– Orange-brown to blackish species; ventral scutum lacking . . . 23

23 Inner keels of chelicerae more concave distally (Fig. 25A–F); tibiae of palp with dorsal and ventral surfaces less curved (Fig. 28B, C, D, E). (West, Central and East Africa) ***elongata*** Szombathy (p. 50)

– Inner keels of chelicerae less concave distally (Fig. 29F, G); palpal tibiae with dorsal and ventral surfaces more curved (Fig. 29C). (Zaire) . . . . . ***lulengensis*** Roewer (p. 55)

24 Tibial apophysis very robust (Fig. 13F). (Botswana, Kenya, Zaire) . ***lulengana*** Roewer (p. 33)

– Tibial apophysis otherwise 25

25 Flange well developed with dorsal indentation (Fig. 11G). (Central and East Africa) ***lawrencei*** Roewer (p. 32)

– Flange otherwise 26

26 Tibial apophysis less elongate, flange well developed in lateral view (Fig. 37B); chelicerae relatively broad (Fig. 36A, E). (Egypt, Libya, Soudan, Yemen) . . ***tristis*** (Simon) (p. 63)

– Tibial apophysis more elongate, flange less well developed (Figs 39E, G; 42J; 43F); chelicerae relatively narrow, except in dwarfs (Figs 40A–K; 41A–C; 43C) 27

27 Abdomen pubescent; carapace with white hairs sometimes forming a longitudinal thoracic fringe (Pl. 4a); tegulum and embolus relatively large (Fig. 39C). (Africa excluding North and North East) . . . . ***marshalli*** Peckham & Peckham (p. 67)

– Abdomen not markedly pubescent; carapace sparsely clothed with very fine hairs, fringe lacking (Pl. 4b); tegulum and embolus relatively small 28

28 Carapace light coloured (yellow-brown); shape as in Fig. 43A. (Mali) ***bamakoi*** Berland & Millot (p. 73)

– Carapace darker (brown-black); shape as in Fig. 41A–C. (Ghana, Ivory Coast) ***legon*** sp. n. (p. 69)

29 Cheliceral fang with double apophysis (Fig. 51F); carapace as in Fig. 51A, B. (Angola, Botswana) . . . . ***dundoensis*** sp. n. (p. 82)

– Not with combination of characters given above 30

30 Flange present (Fig. 15F–H) 31

– Flange absent (Figs 45F, 53C; 58C) 32

31 Carapace with more distinct thoracic ‘hump’ (Fig. 14G); palp as in Fig. 15B, H, tegulum more swollen. (Angola) . . . . ***luachimo*** sp. n. (p. 37)

– Carapace with less distinct ‘hump’ (Fig. 14F); palp as in Fig. 15A, F, G, tegulum less swollen. (Angola, Kenya, Zaire) . . . . ***giltayi*** Roewer (p. 36)

32 Seminal reservoir large (Figs 63B, C; 67A); chelicerae with lower distal margin of fang groove lobate (Figs 64C, D; 66D) 33

– Seminal reservoir medium to small (Figs 46L; 55D, E; 59C); chelicerae otherwise . . 36

33 Carapace relatively high (Fig. 63E, F) 34

– Carapace low (Fig. 66G). (Angola, Zaire) . . . . ***andrewi*** sp. n. (p. 103)

34 Chelicerae with small retrolateral spurs (Figs 63A; 64C); tibial apophysis without minute dorsal spike (Fig. 63I). (Mozambique, South Africa) . . . ***laurentina*** Bacelar (p. 99)

– Chelicerae without spurs (Figs 63D; 64D); tibial apophysis with minute dorsal spike (Fig. 63J, K). (Kenya) . . . . ***kilifi*** sp. n. (p. 102)

35 Fang apophysis lacking (Fig. 46E) 36

– Fang apophysis present (Fig. 48G; 45C) 38

36 Carapace as in Fig. 53B; ventral abdominal scutum present. (Angola, Botswana, South Africa) ***foreli*** Lessert (p. 85)

– Carapace otherwise; ventral abdominal scutum lacking 37

37 More slender species with slender tibial apophysis (Fig. 54C); tibia plus patella IV equal to or larger than carapace length. (Africa excluding North, North East and South West) ***uvira*** sp. n. (p. 86)

– More robust species with thicker tibial apophysis (Fig. 46B); tibia plus patella IV less than carapace length. (South Africa) . . . . . . ***solitaria*** Peckham & Peckham (p. 75)

38 Anterior third of sternum yellowish, posterior two-thirds black; carapace as in Fig. 57F, K. (Ivory Coast) . . . . ***vanessae*** sp. n. (p. 91)

– Sternum and carapace otherwise 39

39 Body form as in Fig. 45A, G; fang arched proximally (Fig. 45C). (Madagascar) ***cowanii*** (Peckham & Peckham) (p. 73)

– Body form and fang otherwise. (Africa) 40

40 Carapace as in Fig. 58A; tegulum very small (Fig. 58E). (Nigeria) . ***russellsmithi*** sp. n. (p. 92)

– Carapace and tegulum otherwise 41

41 Tibia plus patella IV to carapace length less than 0·76 42

– Tibia plus patella IV to carapace length equal to or more than 0·83 43
42 Palp as in Figs 59D; 60B; thoracic hump more pronounced (Fig. 59I). (Kenya) ***kitale*** sp. n. (p. 94)
– Palp as in Figs 59C; 60A; thoracic hump less pronounced (Fig. 59F, G). (South Africa) ***inflatipalpis*** sp. n. (p. 95)
43 Tegulum with cleft in anterior margin (Fig. 49B, C) 44
– Cleft lacking 45
44 Cleft shallow, tibial apophysis more slender (Fig. 49B, E); metatarsi I with 2–2 ventral spines. (South Africa) . . . . ***leleupi*** sp. n. (p. 80)
– Cleft deeper, tibial apophysis thicker (Fig. 49C, F); metatarsi I with 2–2–2–2 or 2–2–2 ventral spines. (Zaire) . . . . ***uelensis*** sp. n. (p. 82)
45 Chelicerae widest proximally (Figs 55A, 56A); fang apophysis short (Fig. 56G, H). (West Africa) . . . . ***nigeriensis*** sp. n. (p. 88)
– Chelicerae widest medially (Fig. 47A); fang apophysis long (Fig. 48G). (North East, East and Southern Africa) . . . . ***kiboschensis*** Lessert (p. 78)

Females

1 Pedicel exceedingly long, anterior segments nearly 10 times length of posterior one (Fig. 73B). (Madagascar) . . . . ***eumenes*** (Simon) (p. 114)
– Pedicel otherwise 2
2 Spermathecae very large (Fig. 83C, E). (Madagascar) . . . . . . ***ransoni*** sp. n. (p. 124)
– Spermathecae otherwise 3
3 Epigyne as in Fig. 72A–C, spermathecae and proximal seminal ducts convoluted. (Madagascar) ***nubilis*** (sp. n. (p. 111)
– Epigyne otherwise 4
4 Epigyne as in Fig. 72D–F, spermathecae and proximal seminal ducts coiled. (Madagascar) ***mahasoa*** sp. n. (p. 112)
– Epigyne otherwise 5
5 Distal seminal ducts coiled (Figs 76C; 77C, D; 80C, D). (Madagascar) 6
– Distal seminal ducts apparently lacking or poorly defined 8
6 Thoracic slope precipitous, posterior margin truncate (Fig. 75B); epigyne as in Fig. 76C, E ***eugenei*** nom. n. (p. 115)
– Thoracic slope not precipitous; epigyne otherwise 7
7 More slender species (Fig. 79B); distal seminal ducts with 4 or 5 spirals (Fig. 80D) ***peckhami*** Roewer (p. 119)
– More robust species (Fig. 77A); distal seminal ducts with 6 or 7 spirals (Fig. 77C–D) ***andringitra*** sp. n. (p. 117)
8 Epigyne with median subtriangular pouch (Figs 46I, J; 48H, K; 53G; 54K; 57C, D; 62A–E) 9
– Epigyne with paired pouches (Figs 11H–K; 15C–E; 18C, D; 19F–H; 28F, G; 31D) . . 23
9 Spermathecae more simple ovoid or elongate ovoid, sometimes bowed (Fig. 62A–E) . . 10
– Spermathecae more complex, looped or twisted (Figs 46J; 48I; 56K) 15
10 More slender species (Fig. 66A, B); carapace low, not constricted (Fig. 66G, I) . . . 11
– More robust species; carapace higher with shallow constriction 12
11 Thoracic slope lacking (Fig. 66I); abdomen very long and tapered (Fig. 66A). (Madagascar) ***longiventris*** (Simon) (p. 105)
– Thoracic slope present (Fig. 66G); abdomen cigar-shaped (Fig. 66B). (Angola, Zaire) ***andrewi*** sp. n. (p. 103)
12 Eye region punctured-reticulate between moderately dense piliferous papillae (Pl. 3a, b); spermathecae globular (Fig. 62D, E). (Angola, Zaire) . . . . ***globosa*** sp. n. (p. 99)
– Not with combination of characters given above 13
13 Eye region punctured-reticulate with ripples between PL; epigyne as in Fig. 65I, J. (Kenya) ***kilifi*** sp. n. (p. 102)
– Not with combination of characters given above 14
14 Thorax sparsely clothed with long, fine whitish hairs; spermathecae curved (Fig. 62A–C). (Madagascar) . . . . ***volatilis*** (Peckham & Peckham) (p. 98)
– Thorax sparsely clothed with long, white lanceolate hairs; spermathecae globular (Fig. 65G, H). (South Africa) . . . . ***laurentina*** Bacelar (p. 99)
15 Elongate species (Fig. 44A); spermathecae convoluted (Fig. 44D). (Madagascar) ***cowanii*** (Peckham & Peckham) (p. 73)

– Not with combination of characters given above. (Africa) 16
16 Tibia plus patellae IV to carapace length equal to or less than 0·73 17
– Tibia plus patellae IV to carapace length equal to or more than 0·80 19
17 More slender species with shallow postocular constriction (Fig. 53A, E). (Angola, Botswana, South Africa) . . . . ***foreli*** Lessert (p. 85)
– More robust species with deeper postocular constriction 18
18 Carapace as in Fig. 46G, D; spermathecae looped (Fig. 46J). (South Africa) ***solitaria*** Peckham & Peckham (p. 75)
– Carapace as in Fig. 59E, H; spermathecae looped with a slight twist (Fig. 60K–M). (Kenya) ***kitale*** sp. n. (p. 94)
19 Carapace as in Fig. 57A, G; anterior half of sternum and coxae I–II whitish, posterior half and coxae III–IV blackish. (Ivory Coast) . . . . ***vanessae*** sp. n. (p: 91)
– Carapace, sternum and coxae otherwise 20
20 Quadrangle length to carapace length equal to or less than 0·39 21
– Quadrangle length to carapace length equal to or more than 0·41 22
21 Legs I with blackish tarsi; epigyne as in Fig. 52B, D, E. (Angola, Botswana) ***dundoensis*** sp. n. (p. 82)
– Legs I with whitish or light yellowish tarsi; epigyne as in Fig. 54K–M. (Africa excluding North, North East and South West) . . . . ***uvira*** sp. n. (p. 86)
22 More slender species (Fig. 55C); epigyne as in Fig. 56I, K, L. (Nigeria) ***nigeriensis*** sp. n. (p 88)
– More robust species, carapace, Fig. 48E, F; epigyne as in Fig. 48H–K. (Botswana, Kenya, Sudan, Tanzania) . . . . ***kiboschensis*** Lessert (p. 78)
23 Thorax very long (Fig. 18A, E); epigyne as in Fig. 18C, D. (South Africa) ***natalica*** Lessert (p. 39)
– Thorax and epigyne otherwise 24
24 Carapace constriction deep but thorax very low (Fig. 33E); dorsal surface of abdomen with darker bands on lighter background (Fig. 33B). (West and Central Africa) ***foenisex*** Simon (p. 60)
– Carapace and abdomen otherwise 25
25 Carapace with more or less distinct thoracic hump (Fig. 14E); spermathecae relatively simple (Fig. 15D, E). (Angola) . . . . ***luachimo*** sp. n. (p. 37)
– Carapace and epigyne otherwise 25
26 Cephalic part with subparallel sides in dorsal view (Fig. 19A, I). 27
– Cephalic part with curved sides in dorsal view 28
27 Lateral pouches situated at distal end of proximal seminal ducts (Fig. 19C). (Fernando Po, Ghana) . . . . ***insulana*** Roewer (p. 40)
– Lateral pouches situated midway along proximal seminal ducts (Fig. 19D). (Angola) ***mussungue*** sp. n. (p. 42)
28 Body form more elongate (Figs 27B; 31C) 29
– Body form less elongate 30
29 Light orange species (Fig. 31C, E); Epigyne with contiguous lateral pouches (Fig. 31D, F). (East and Southern Africa) . . . . ***ichneumon*** (Simon) (p. 56)
– Darker species (orange-brown or brown-black) (Figs 26F, 27B); epigyne with separate lateral pouches (Fig. 28F–I). (West, Central and East Africa) . . . ***elongata*** Szombathy (p. 50)
30 Epigyne as in Fig. 37C–E, lateral pouches relatively large; carapace with two long trichobothria in mid-dorsal region of postocular constriction. (Egypt, Libya, Soudan, Yemen) ***tristis*** (Simon) (p. 63)
– Epigyne otherwise; carapace with four long trichobothria in mid-dorsal region of postocular constriction 31
31 Lateral pouches approximate or contiguous 32
– Lateral pouches widely separate 33
32 Tibia plus patella IV to carapace length equal to or greater than 0·92; usually a scanty, longitudinal white haired fringe on thorax; epigyne usually indistinct (Fig. 39A, B). (Africa excluding North, North East and South West) . . . ***marshalli*** Peckham & Peckham (p. 67)
– Tibia plus patella IV to carapace length equal to or less than 0·90; thoracic fringe lacking; epigyne usually very indistinct (Fig. 42K). (Ghana, Ivory Coast) . . ***legon*** sp. n. (p. 69)
33 Epigyne as in Fig. 12J, K; spermathecae more complex, proximal seminal ducts more slender. (Botswana, Kenya, Zaire) . . . . ***lulengana*** Roewer (p. 33)
– Epigyne as in Fig. 11H–K; spermathecae simpler, proximal seminal ducts wide ***lawrencei*** Roewer or ***militaris*** Szombathy (p. 32, 30)

The *tristis*-group

Male palp with tibial apophysis hooked (Fig. 28B, C) or rarely sigmoid (Fig. 17B); flange present, usually well developed; proximal ectal margin of cymbium depressed, fringed with setae; embolus long and slender. Epigyne with lateral pouches.

The *tristis*-group is mainly African in distribution but it also occurs in the Palaeartic and Oriental regions. It is essentially based on the female genitalia which are characterized by the lateral pouches. Most males are readily placed in this group by the hooked tibial apophysis but some species (e.g. *M. eidmanni* Roewer, *M. giltayi* Roewer and *M. luachimo* sp. n.) with a sigmoid

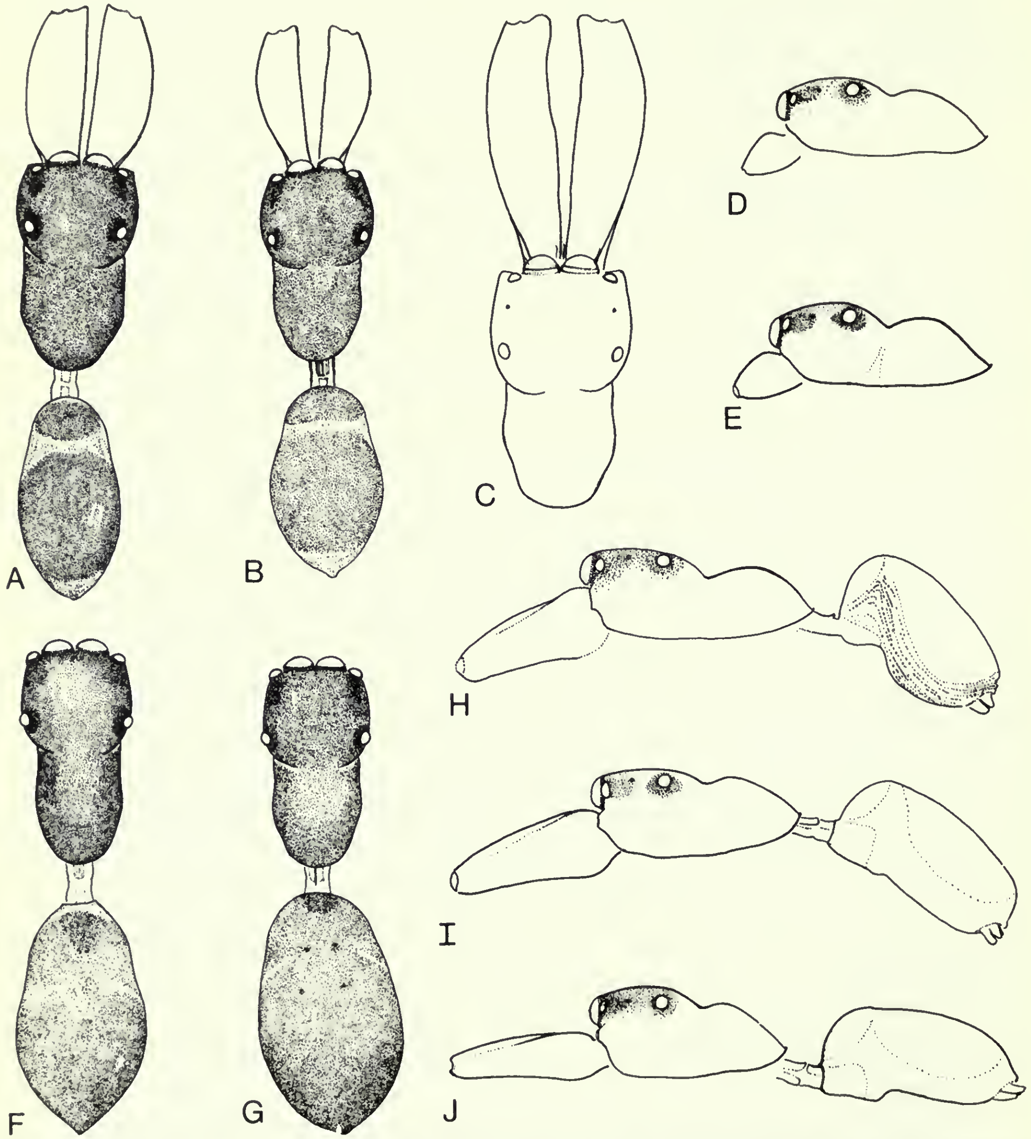

Fig. 10 (A, E, F, H, I) *Myrmarachne militaris* Szombathy. Lectotype ♂: (A) dorsal view; (I) lateral view. Holotype ♂ of *M. schoutedeni* Roewer: (H) lateral view. ♀ from Kenya: (F) dorsal view; (E) carapace, lateral view. (B, C, D, G, J) *Myrmarachne lawrencei* Roewer. Holotype ♂: (B) dorsal view; (J) lateral view. ♂ from Gabon: (C) carapace, dorsal view. Paratype ♀: (G) dorsal view; (D) carapace, lateral view.

tibial apophysis are intermediate between the *tristis* and *formicaria*-groups. *M. luachimo* is known in both sexes and it certainly belongs here but *eidmanni* and *giltayi* are only known from males and their position is a little uncertain.

The 24 species constituting this large group in the Ethiopian region are in some cases difficult to separate as there is marked allometric variation. Some species (e.g. *M. marshalli* Peckham & Peckham, *M. legon* sp. n. *M. elongata* Szombathy and *M. ichneumon* (Simon)) vary greatly in size and the smallest forms or dwarfs cannot readily be distinguished from one another. The

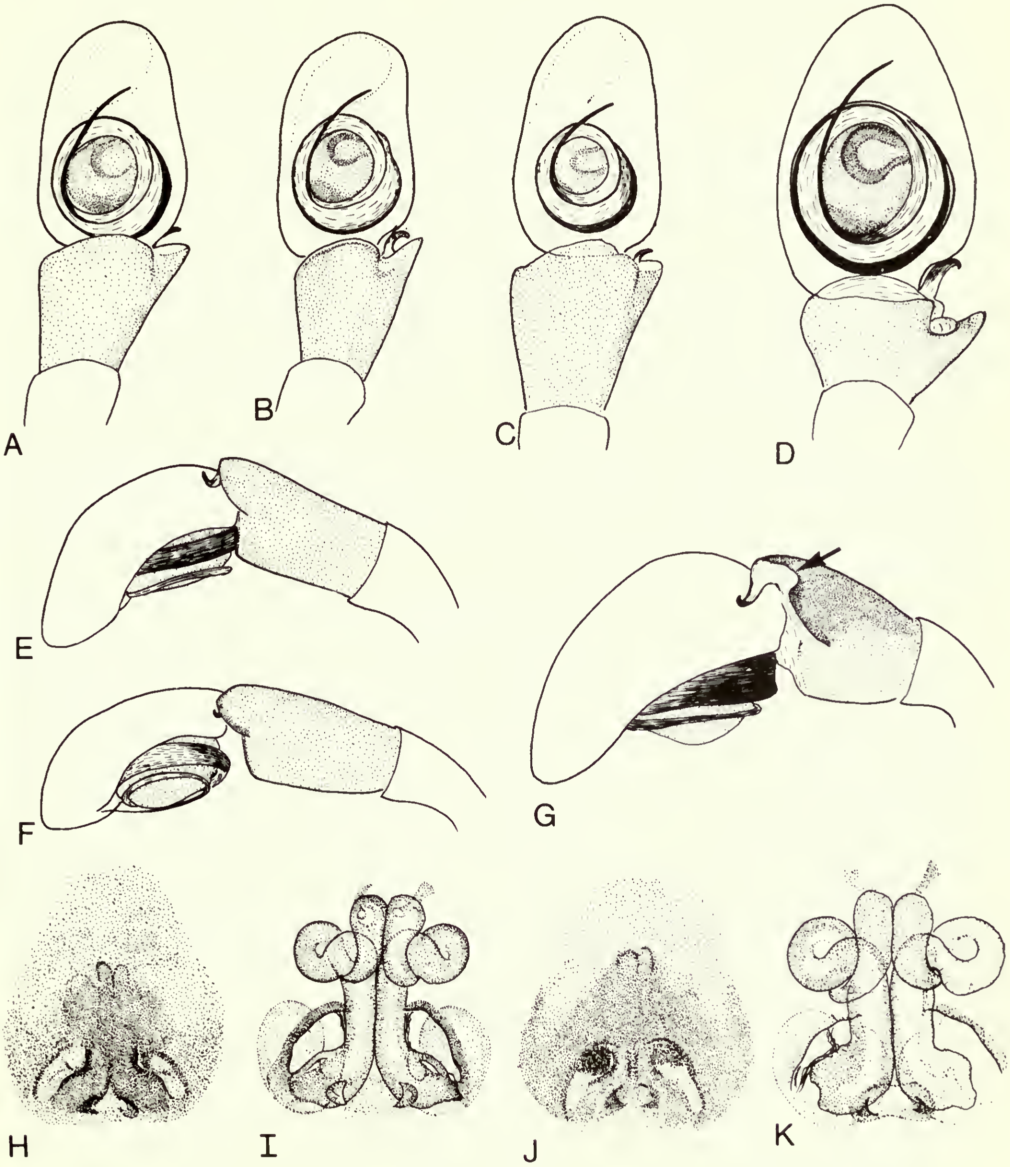

Fig. 11 (A–C, E, F, H, I) *Myrmarachne militaris* Szombathy. Lectotype ♂: (A) palp, ventral view; (E) palp, lateral view. Holotype ♂ of *M. paucidentata* Berland & Millot: (B) palp, ventral view; (F) palp, lateral view. Holotype ♂ of *M. schoutedeni* Roewer: (C) palp, ventral view. ♀ from Kenya: (H) epigyne, ventral view; (I) vulva, ventral view. (D, G, J, K) *Myrmarachne lawrencei* Roewer. Holotype ♂: (D) palp, ventral view; (G) palp, lateral view. Paratype ♀: (J) epigyne, ventral view; (K) vulva, ventral view.

problem is aggravated by insufficient material and the suspicion that dwarf forms may be a widespread phenomenon.

Also in this group I have used the presence of either two or four trichobothria in the mid-dorsal region of the postocular constriction to separate three closely related species. These sensory hairs are long, smooth and sinuous and set in relatively large sockets. They are more robust than leg trichobothria but probably have an homologous function. The posterior pair, when present, are usually shorter than the anteriors but unfortunately their usefulness as a diagnostic character is limited by the fact that they are sometimes lost (rubbed) and their sockets cannot always be readily seen in very dark or strongly sculptured specimens.

Myrmarachne militaris Szombathy

(Fig[illegible] E, F, H, I; 11A–C, E, F, H, I; 12A, B, E, H)

Myrmarachne militaris S[illegible] 1913 : 33, fig. 9, ♂. LECTOTYPE ♂ (here designated), Tanzania, Arusha (TM, B[illegible]ed]. Roewer, 1954 : 943. Bonnet, 1957 : 3010. Roewer, 1965 : 45, fig. 47.

Myrmarachne maerens Lesse[illegible]25 : 445, figs 23–25, ♂. Holotype ♂, Tanzania, Kibonoto culture zone (NR, Stockholm and M[illegible]N, Geneva) [Examined]. Caporiacco, 1940 : 855. Roewer, 1954 : 943. Bonnet, 1957 : 3009. Roewer, 1965 : 41, figs 51, 51a. Prószyński, 1971b : 439. **Syn. n.**

Myrmarachne paucidentata Berland & Millot, 1941 : 408, fig. 98a, b, c, ♂. Holotype ♂, Senegal, Dakar (MNHN, Paris) [Examined]. Roewer, 1954 : 943; 1965 : 73, fig. 53. **Syn. n.**

Myrmarachne schoutedeni Roewer, 1965 : 51, fig. 44, ♂. Holotype ♂, Zaire, Mauda (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 440. **Syn. n.**

DIAGNOSIS. *M. militaris* closely resembles *M. lawrencei* Roewer and *M. lulengana* Roewer. Males are separated by the small tegulum (Fig. 11A, B, C) and pronounced flange which more or less obscures the tibial apophysis (Fig. 11E, F). Female *militaris* and *lawrencei* cannot be distinguished at present but they are both separated from *lulengana* females by the less complex spermathecae and wider seminal ducts (Fig. 11I).

MALE. *Carapace* (Fig. 10A, H, I): punctured-reticulate; brown-black; clothed with scattered, fine whitish hairs with white wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: fringed with light brownish hairs. *Chelicerae* (Fig. 12A, B, E): rugulose with furrows; orange-brown with black lateral keels; fang apophysis present. *Maxillae and Labium*: orange-brown tinged with black but inner margins of maxillae and labial tip lighter. *Sternum* (Fig. 12H): orange-brown tinged with black. *Abdomen* (Fig. 10A, I): mottled yellow-brown and black with dark orange-brown scuta; clothed with light golden or whitish hairs. *Legs*: slender, legs I tarsi and metatarsi brown-black; tibiae and patellae yellow-brown with brown-black lateral streaks; femora brown-black with distal yellow-brown streak inside; trochanters and coxae dark brownish. Legs II as I but tarsi and metatarsi yellow-brown. Legs III brown-black with tarsi yellow-brown. Legs IV as III but tarsi blackish tipped with yellow-brown; patellae marked with yellow-brown and trochanters whitish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2 or 2–2–2–2, patellae 0 or 1. *Palp* (Fig. 11A–C, E, F): tibial apophysis small, more or less obscured by fan-like flange which varies in development; proximal depression fringed with slender setae; seminal reservoir small and tegulum in relation to the cymbium also small.

Dimensions: total length 4·40–6·48 mm, carapace length 2·10–3·04 mm. *Ratios*: AM : AL : PM : PL: 9·5 : 5 : 1 : 5, AL–PM–PL: 7–6·5; a: 0·88–0·98, b: 0·95–1·0, c: 0·36–0·39, d: 0·64–0·8, e: 0·79–0·88 (10♂ examined).

FEMALE from Kenya, Kitale. *Carapace* (Fig. 10E, F): more or less as in ♂. *Eyes*: as in ♂. *Clypeus*: fringed with dark brown hairs. *Chelicerae*: medially rugulose; dark orange-brown; promargin with 6 or 7 teeth, retromargin with 7 or 9. *Maxillae and Labium*: as in ♂. *Sternum*: as in ♂. *Abdomen*: greyish with dark brown patch anteriorly and 4 impressed dots dorsally; clothed with bright golden hairs. *Legs*: slender; legs I tarsi and metatarsi brown-black; tibiae and patellae yellow-brown with blackish lateral streaks; femora brown black but distal venter yellowish; trochanters and coxae brown-black but venters marked with yellowish. Legs II similar to I but femora yellowish with black sides; trochanters and coxae yellowish, the latter with black basal spots. Legs III and IV as in ♂. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2, patellae 0. *Epigyne* (Fig. 11H, I): lateral pouches separate, spermathecae simple, basic figure of eight configuration; ducts relatively wide.

Dimensions: total length 5·44 mm, carapace length 2·48 mm. Ratios: AM : AL : PM : PL: 8·5 : 4·5 : 1 : 4, AL–PM–PL: 7–8·5; a: 1·04, b: 1·04, c: 0·39, e: 0·79 (1♀ examined).

Biology. Unknown.

Distribution. Kenya, Malawi, Senegal, Tanzania, Zaire.

Material examined. Type data given in synonymy. Kenya: Kitale, 2000 m, taken from cells on reeds at edge of small freshwater dam, 1♀, 16.viii, 1♂ 22.viii.1972; beaten from shrubs in farm garden about 20 miles [32 km] north of Kitale, 1♀, 20.vii.1974 (*J. & F. Murphy*) (BMNH). Malawi: Chintheche, 1♂, 30.xii.1975 (*R. Jocqué*, MT 148105) (MRAC, Tervuren). Tanzania: 2nd Oxford University Tanganyika Expedition, Kasoje Camp, 1♂, 19.vii.1959 (*D. H. Eccles*); Katumbe, swept off burnt-over vegetation, 1♂, 10.vii.1959 (*J. A. L. Cooke*) (BMNH). Zaire:

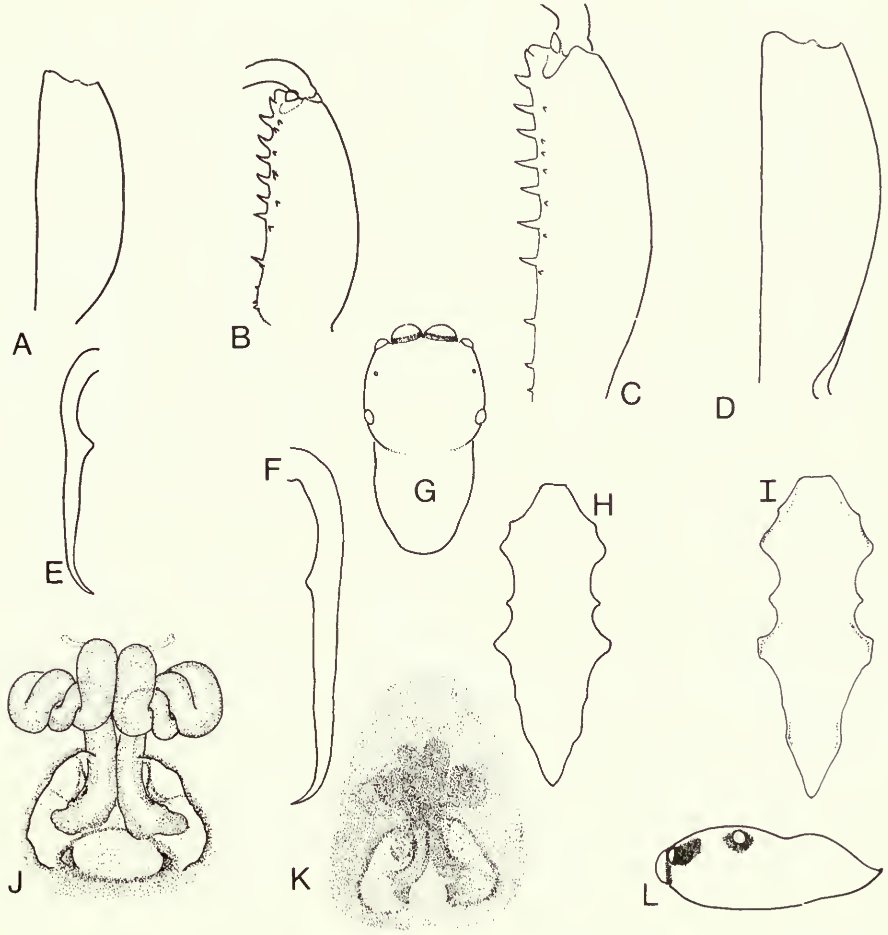

Fig. 12 (A, B, E, H) *Myrmarachne militaris* Szombathy. ♂: (A) chelicera, dorsal view; (B) chelicera, ventral view; (E) fang; (H) sternum. (C, D, F, I) *Myrmarachne lawrencei* Roewer. ♂: (C) chelicera, ventral view; (D) chelicera, dorsal view; (F) fang; (I) sternum. (G, J–L) *Myrmarachne lulengana* Roewer. ♀ from Kenya: (G) carapace, dorsal view; (J) vulva, ventral view; (K) epigyne, ventral view; (L) carapace, lateral view.

Ituri, Olokoko, Faradje, 1♂, 2.ii.1930 (*A. Collart*, MT 130.771); Hte Uele, Moto, 2♂, xi.1922 (*L. Burgeon*, MT 130.760) (MRAC, Tervuren).

REMARKS. On the basis of the present material I am unable to find reliable characters for separating female *militaris* and *lawrencei*. Unfortunately the species are sympatric and differences in the abdominal pubescence may not be consistent. I have therefore not included data from several females of uncertain identity. A larger series of specimens should solve the problem but it should also be borne in mind that either of the females described here as *militaris* or *lawrencei* may be misidentified.

Myrmarachne lawrencei Roewer

(Figs 10B, C, D, G, J; 11D, G, J, K; 12C, D, F, I)

Myrmarachne lawrencei Roewer, 1965 : 56, figs 59, 59a, ♂, ♀. Holotype ♂, Zaire, Kadjuju (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 439.

DIAGNOSIS. *M. lawrencei* is closely related to *M. militaris* Szombathy and *M. lulengana* Roewer. Males are separated by the large, distally hooked tibial apophysis and pronounced flange which has a more or less distinct dorsal, indentation (Fig. 11G). Female *lawrencei* are distinguished from female *lulengana* by the less complex spermathecae and wider seminal ducts (Fig. 11K), and doubtfully separated from *militaris* by the whitish abdominal pubescence.

MALE. *Carapace* (Fig. 10B, C, J): punctured-reticulate; orange-brown to brown-black with a violet sheen under some lights; sparsely clothed with fine whitish hairs with white wedge-shaped bands in constriction: *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: fringed with light brown hairs. *Chelicerae* (Fig. 12C, D, F) rugulose with furrows; dark orange with black lateral keels; fang apophysis present. *Maxillae and Labium*: orange-brown tinged with black but inner margins of maxillae and labial tip lighter. *Sternum* (Fig. 12I): orange-brown with some blackish on margins. *Abdomen* (Fig. 10B, J): mottled brownish black with dark reddish brown scuta; clothed with whitish hairs with scattered, whitish lanceolate setae in constriction. *Legs*: slender; legs I tarsi and metatarsi blackish; tibiae and patellae light orange-brown with blackish lateral streaks; other segments orange-brown. Legs II light orange-brown with blackish streaks along inside of tibiae and patellae. Legs III orange-brown grading to light orange-brown on metatarsi and tarsi. Legs IV as III but trochanters and patellae marked with yellowish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–1 or 2–2–1–2, patellae 0. *Palp* (Fig. 11D, G): tibial apophysis large with a distal hook; flange strongly developed with a dorsal indentation; proximal depression clearly fringed with stout setae; seminal reservoir of medium size but tegulum (in lateral view) somewhat bulbus.

Dimensions: total length 4·80–5·50 mm, carapace length 2·12–2·68 mm; *Ratios*: AM : AL : PM : PL: 8·5 : 4 : 1 : 4, AL–PM–PL: 6–7; a: 0·86–1·0, b: 0·94–1·0, c: 0·37–0·40, d: 0·70–1·0, e: 0·76–0·91 (4♂ examined).

FEMALE PARATYPE. *Carapace* (Fig. 10G, D): more or less as in ♂. *Eyes*: as in ♂. *Clypeus*: fringed with light brownish hairs. *Chelicerae*: medially rugulose; orange-brown; promargin with 5 teeth, retromargin with 8. *Maxillae and Labium*: as in ♂. *Sternum*: as in ♂. *Abdomen*: greyish with a dark brown patch anteriorly and 4 impressed dots dorsally; clothed with fine whitish hairs with a very scanty band of whitish lanceolate setae in constricted area. *Legs*: slender; legs I tarsi orange-brown; metatarsi blackish; tibiae and patellae light orange-brown with blackish lateral streaks; femora dark orange-brown with distal, dorsal and ventral parts yellowish; trochanters brown with venter yellow-brown; coxae yellow-brown with inner sides blackish. Legs II yellow-brown with black streaks along sides of tibiae, patellae and femora; also a blackish spot on outside of coxae. Legs III and IV as in ♂. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2, patellae 0. *Epigyne* (Fig. 11J, K): lateral pouches separate; spermathecae simple, basic figure of eight configuration; ducts relatively wide.

Dimensions: total length 5·30 mm, carapace length 2·32 mm. *Ratios*: AM : AL : PM : PL: 8·5 : 4 : 1 : 4·5, AL–PM–PL: 6–7, a: 1·04, b: 1·04, c: 0·37, e: 0·81 (1♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Gabon, Kenya, Tanzania, Zaire.

MATERIAL EXAMINED. Holotype ♂, data given in synonymy. GABON: 1♂ (ex coll, Simon) (MNHN, Paris). KENYA: Nairobi, 1♂, 13.viii.1959 (*J. G. Williams*) (BMNH). TANZANIA: Kasoje, Kangwena Camp, on breakfast table, 1♂, 10.ix.1959 (*D. H. Eccles*) (BMNH).

REMARKS. Several unaccompanied females from Zaire, thought to belong with this species, have not been formally included in the descriptions or material examined as I still have doubts as to the identification of females (see remarks under *M. militaris*, p. 000).

Myrmarachne lulengana Roewer
(Figs 12G, J–L; 13A–H)

Myrmarachne lulengana Roewer, 1965 : 50, fig. 42, ♂. Holotype ♂, Zaire, Lulenga (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 439.

DIAGNOSIS. *M. lulengana* is closely related to *M. lawrencei* Roewer and *M. militaris* Szombathy.

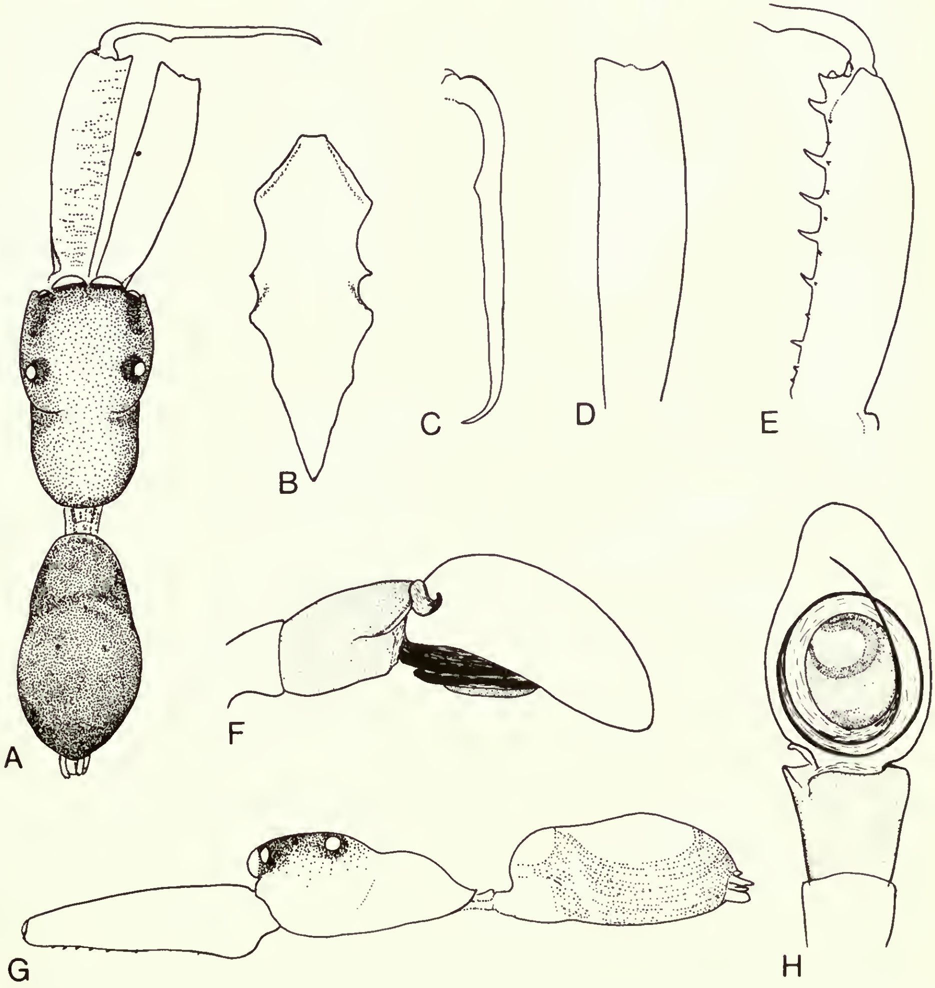

Fig. 13 *Myrmarachne lulengana* Roewer. Holotype ♂: (A) dorsal view; (B) sternum; (C) fang; (D) chelicera, dorsal view; (E) chelicera, ventral view; (F) palp, lateral view; (G) lateral view; (H) palp, ventral view.

Males are separated by the robust tibial apophysis and pronounced flange (Fig. 13F). Females are distinguished from female *militaris* and *lawrencei* by the more complex spermathecae and more slender ducts (Fig. 12J).

MALE. *Carapace* (Fig. 13A, G): punctured-reticulate with papillae on thoracic part; orange-brown to brown-black with scattered, fine white hairs and white haired wedges in constriction. *Eyes*:

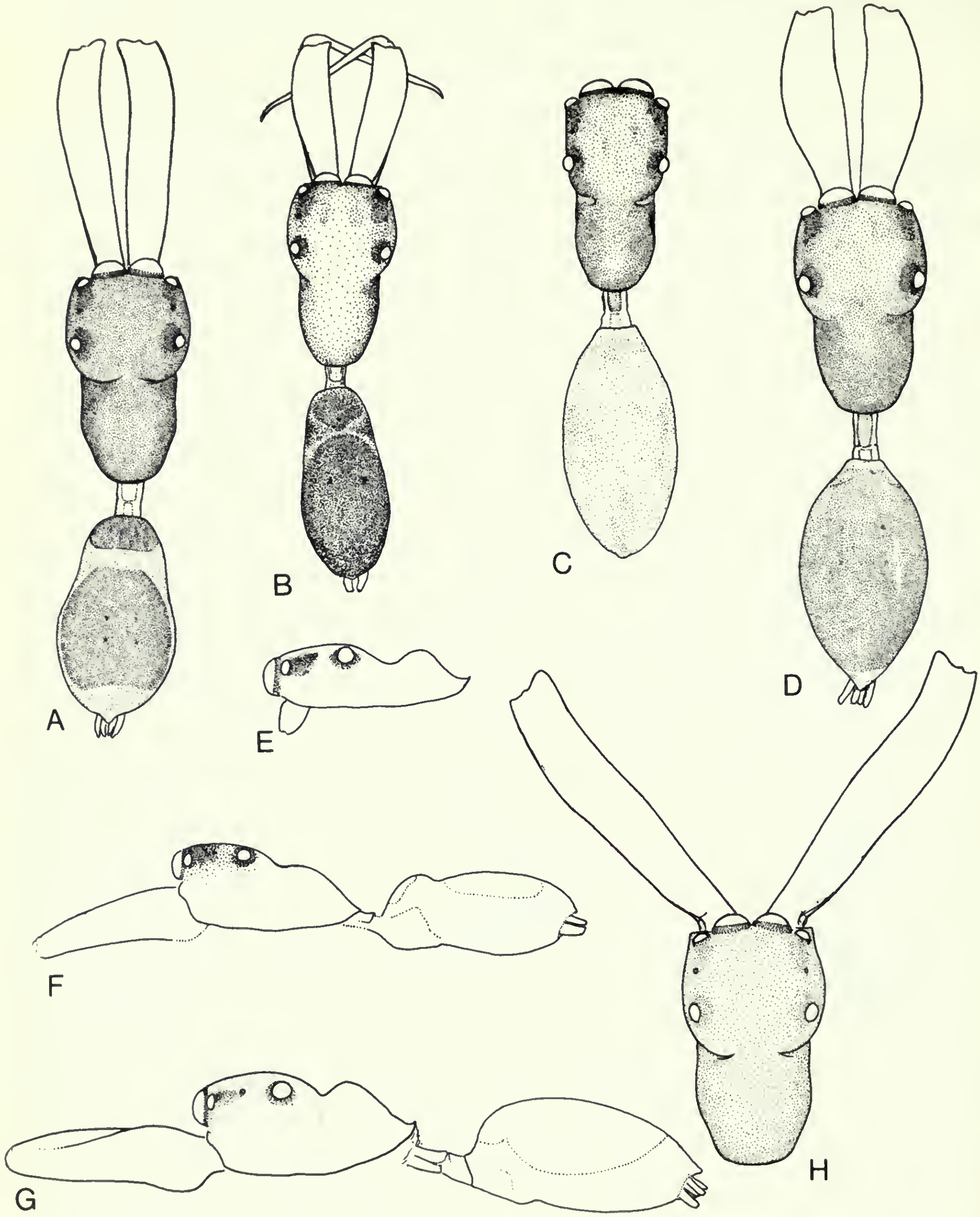

Fig. 14 (A, B, F, H) *Myrmarachne giltayi* Roewer. ♂ from Angola: (A) dorsal view. Holotype ♂: (B) dorsal view; (F) lateral view. ♂ from Zaire: (H) carapace, dorsal view. (C, D, E, G) *Myrmarachne luachimo* sp. n. Paratype ♀: (C) dorsal view; (E) carapace, lateral view. Holotype ♂: (D) dorsal view; (G) lateral view.

anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: fringed with long whitish hairs. *Chelicerae* (Fig. 13C–E): rugulose with furrows; orange-brown; fang apophysis present. *Maxillae and Labium*: orange-brown tinged with black but inner margin of maxillae and labial tip lighter. *Sternum* (Fig. 13B): orange-brown tinged with black with some darkening around the margins. *Abdomen* (Fig. 13A, G): blackish with dark orange-brown scuta; clothed with fine whitish hairs and scattered, whitish lanceolate setae in constriction and fore part of posterior scutum. *Legs*: slender; legs I tarsi and metatarsi yellow-brown tinged with blackish; tibiae and patellae yellow-brown with blackish lateral streaks; femora dark brownish; trochanters and coxae yellow-brown the former with blackish sides. Legs II yellow-brown but inside of tibae, patellae and femora brown-black. Legs III dark orange-brown but distal tibiae, metatarsi and tarsi yellow-brown and trochanters and coxae orange-brown tinged with black. Legs IV dark orange-brown but trochanters, metatarsi distally and tarsi yellow-brown with yellow-brown mark on patellae. Ventral spination of legs I: metatarsi 2–2; tibiae 2–2–1–2; patellae 0. *Palp* (Fig. 13F, H): tibial apophysis robust; flange well developed; proximal depression fringed with stout setae; seminal reservoir of medium size. In small specimens there is a tendency for the tibiae to be deeper anteriorly and resemble that of *M. lawrencei*.

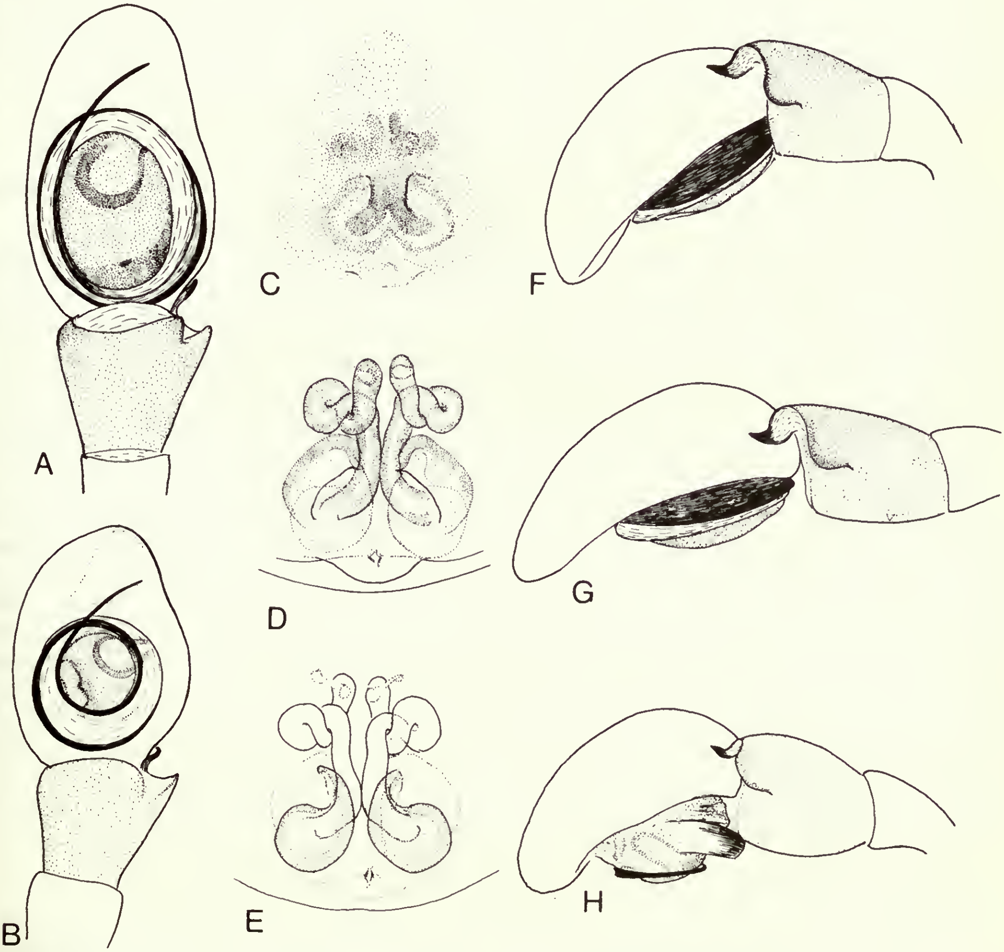

Fig. 15 (A, F, G) *Myrmarachne giltayi* Roewer. Holotype ♂: (A) palp, ventral view; (F) palp, lateral view. ♂ from Angola, (G) palp, lateral view. (B–E, H) *Myrmarachne luachimo* sp. n. Holotype ♂: (B) palp, ventral view; (H) palp, lateral view. Paratype ♀: (C) epigyne ventral view; (D) vulva, ventral view; (E) vulva, dorsal view.

Dimensions: total length 3·8–5·3 mm, carapace length 1·62–2·56 mm. *Ratios*: AM : AL : PM : PL: 10 : 5·2 : 2 : 6, AL–PM–PL: 7–7; a: 0·92–0·98, b: 0·97–1·0, c: 0·40–0·41, d: 0·50–1·0, e: 0·72–0·83 (4♂ examined).

FEMALE. *Carapace* (Fig. 12G, L): punctured-reticulate; brown-black with scattered fine white hairs and white-haired wedges in constriction. *Eyes*: more or less as in ♂. *Clypeus*: fringed with long light brown hairs. *Chelicerae*: rugulose; orange-brown; promargin with 8 teeth, retromargin with 7. *Maxillae and Labium*: as in ♂. *Sternum*: dark orange-brown tinged with black. *Abdomen*: blackish with a dark brownish patch anteriorly; clothed with dull whitish hairs more or less distributed as in ♂. *Legs*: as in ♂ but ventral spination of legs I: metatarsi 2–2, tibiae 1–2–1 or 2–2–2–2, patellae 0. *Epigyne* (Fig. 12J, K): lateral pouches separate; spermathecae more complex than basic figure of eight configuration.

Dimensions: total length 4·68–5·36 mm, carapace length 1·92–2·44 mm; *Ratios*: AM : AL : PM : PL: 7 : 3·5 : 1 : 4, AL–PM–PL: 5–7; c: 0·39–0·42, e: 0·73–0·77 (3♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Botswana, Kenya, Zaire.

MATERIAL EXAMINED. Holotype ♂, data given in synonymy. BOTSWANA: Environs of Kewbe Hills, in vehicle, 1♂, 30.iii.1976 (*A. Russell-Smith & F. Wanless*) (BMNH). KENYA: Lake Naivasha beaten from kei apple hedge, 2♂, 2♀, 3.viii.1974 (*J. & F. Murphy*) (BMNH). ZAIRE: Kivu. Nyanukuli, 1♀, 9.ii.1932 (*L. Burgeon*, MT 31286–7 part) (MRAC, Tervuren).

Myrmarachne giltayi Roewer

(Figs 14A, B, F, H; 15A, F, G: 16D–F, H)

Myrmarachne giltayi Roewer, 1965 : 52, fig. 45, ♂. Holotype ♂, Zaire, Elizabethville (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 438.

DIAGNOSIS. *M. giltayi* is a variable species, sympatric with *M. lulengana* Roewer and *M. luachimo* sp. n. It is closest to *luachimo* from which it is distinguished by the less bulbous tegulum (Fig. 15F, D) and lack of a distinct thoracic 'hump' (Fig. 14F); it is separated from *lulengana* by the form of the tibial apophysis (Fig. 15F, D).

FEMALE. Unknown.

MALE. *Carapace* (Fig. 14A, B, F, H): punctured-reticulate; orange-brown with fine, scattered white hairs and white-haired bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: fringed with white hairs. *Chelicerae* (Fig. 16D–F): rugulose with furrows; orange-brown; fang apophysis present. *Maxillae and Labium*: orange tinged with black but inner margin of maxillae and labial tip lighter. *Sternum* (Fig. 16H): orange with darker margins. *Abdomen* (Fig. 14A, B, F): mottled yellow-brown and black with shiny orange-brown scuta, sparsely clothed with very fine hairs. *Legs*: slender; legs I tarsi yellow-brown; metatarsi blackish; remaining segments yellow-brown with sooty lateral streaks. Legs II as I but metatarsi yellow-brown. Legs III yellow-brown but coxae, trochanters, femora, patellae and sides of tibiae tinged with black. Legs IV as III but coxae, trochanters and patellae marked with light yellowish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 0. *Palp* (Fig. 15A, F, G): tibial apophysis sigmoid and robust; flange well developed; proximal depression fringed with moderately stout setae; seminal reservoir of medium size.

Dimensions: total length 4·52–6·40 mm, carapace length 2·08–2·80 mm. *Ratios*: a: 0·94–1·02, b: 0·95–1·02, c: 0·39–0·41, d: 0·82–1·25, e: 0·75–0·87 (7♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Angola, Kenya, Zaire.

MATERIAL EXAMINED. Holotype ♂, data given in synonymy. ANGOLA: Chutes Luisavo, 3♂, 23.ii.1955 (Local collector, Ang. 10018.20) (BMNH). KENYA: Lake Naivasha, beaten from kei apple hedge, 1♂, 3.viii.1974 (*J. & F. Murphy*) (BMNH). ZAIRE: Kivu, Kanyamavono Valley, Ruindi Plain, 1200 m, in dead wood, 1♂, 16.vi.1972 (*R. P. M. Lejeune*, MT 144.685); Lake Kivu, Isle Suhu, 1♂, 1.xii.1932 (*L. Burgeon*, MT 11809–10) (MRAC, Tervuren).

Myrmarachne luachimo sp. n.

(Figs 14C, D, E, G; 15B–E, H; 16A–C, G)

Diagnosis. *M. luachimo* is sympatric with *M. giltayi* Roewer and *M. lulengana* Roewer. It is closely related to *giltayi* from which it is distinguished by the thoracic shape (Fig. 14E, G) and more bulbous tegulum (Fig. 15H). It is separated from *lulengana* by the shape of the thorax and the form of the tibial apophysis.

Male. *Carapace* (Fig. 14D, G): punctured-reticulate; dark orange with white wedge-shaped bands in constriction. *Eyes*: anteriors more or less contiguous with apices procurved, sparsely fringed with whitish hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 16A–C): rugulose with furrows; orange; fang apophysis a slight swelling. *Maxillae and Labium*: pale yellow-orange. *Sternum* (Fig. 16G): light orange. *Abdomen* (Fig. 14D, G): light yellowish with contiguous pale orange scuta. *Legs*: slender, light yellowish to pale orange. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2 and 2–1, patellae 0. *Palp* (Fig. 15B, H): distal hook lacking; flange moderately developed; proximal depression fringed with moderately stout setae; tegulum bulbous.

Dimensions: total length 3·76 mm, carapace length 1·66 mm. *Ratios*: AM : AL : PM : PL: 8 : 3·5 : 1 : 4, AL–PM–PL: 4·5–6; a: 1·01, b: 1·0, c: 0·43, d: 0·86, e: 0·65 (1♂ examined).

Female. *Carapace* (Fig. 14C, E): finely punctured-reticulate; dark orange, shiny with white haired bands in constriction. *Eyes*: more or less as in ♂. *Clypeus*: sparsely fringed with whitish hairs. *Chelicerae*: light orange; teeth not examined. *Maxillae and Labium*: orange-brown *Sternum*: light orange, shiny. *Abdomen*: light yellowish tinged with grey; a scanty white haired

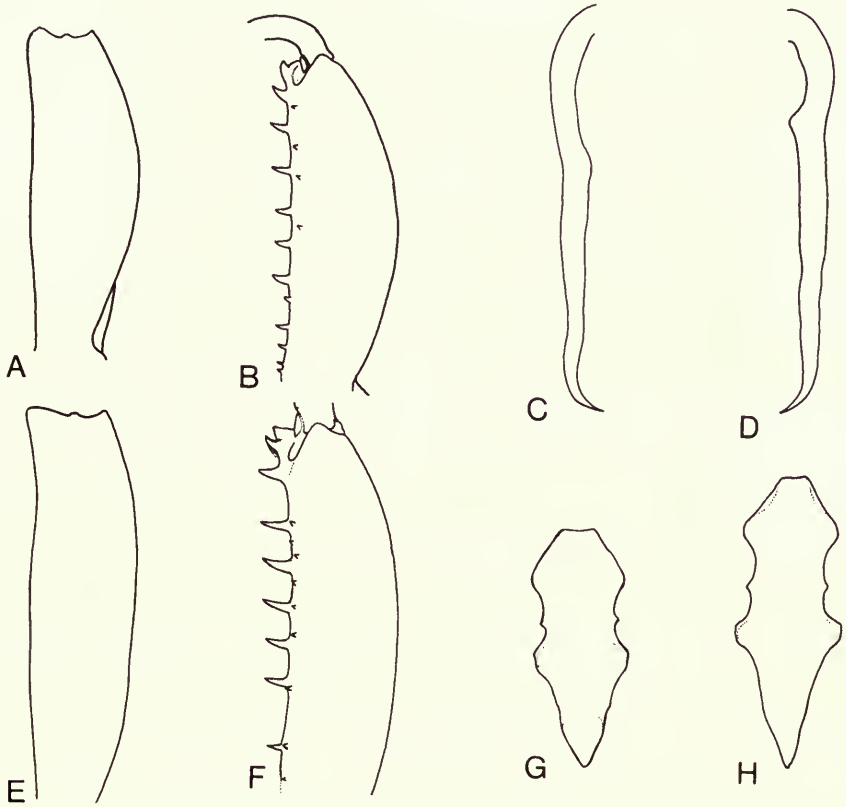

Fig. 16 (A–C, G) *Myrmarachne luachimo* sp. n. ♂: (A) chelicera, dorsal view; (B) chelicera, ventral view; (C) fang; (G) sternum. (D–F, H) *Myrmarachne giltayi* Roewer. ♂: (D) fang; (E) chelicera, dorsal view; (F) chelicera, ventral view; (H) sternum.

band in constriction. *Legs*: slender; legs I whitish yellow with greyish streaks along inside of tibiae and patellae and on both sides of femora. Legs II as I but grey streaks on outside of femora lacking. Legs III with tarsi and metatarsi whitish yellow; tibiae whitish yellow with greyish proximally; patellae whitish yellow with grey distally; other segments yellow-brown tinged with grey. Legs IV as III but trochanters whitish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2, patellae 0. *Epigyne* (Fig. 15C–E): lateral pouches approximate; spermathecae simple, basic figure of eight configuration.

Dimensions: total length 3·76 mm, carapace length 1·56 mm. *Ratios*: AM : AL : PM : PL: 7·5 : 3·4 : 1 : 3·4, AL–PM–PL: 4·5–4; a: 1·02, b: 1·05, c: 0·41, e: 0·65 (1 ♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Angola.

MATERIAL EXAMINED. Holotype ♂, ANGOLA: Dundo, forest gallery, R. Luachimo, collected with Japanese umbrella, 30.ix.1946 (*A. B. Machado*, Ang. 53.2) (MD, Dundo). Paratype ♀, Angola: forest gallery, R. Tchirimbo, in litter, 9.vii.1954 (*A. B. Machado*, Ang. 4323.49) (BMNH).

ETYMOLOGY. The specific name is a noun in apposition taken from the type-locality.

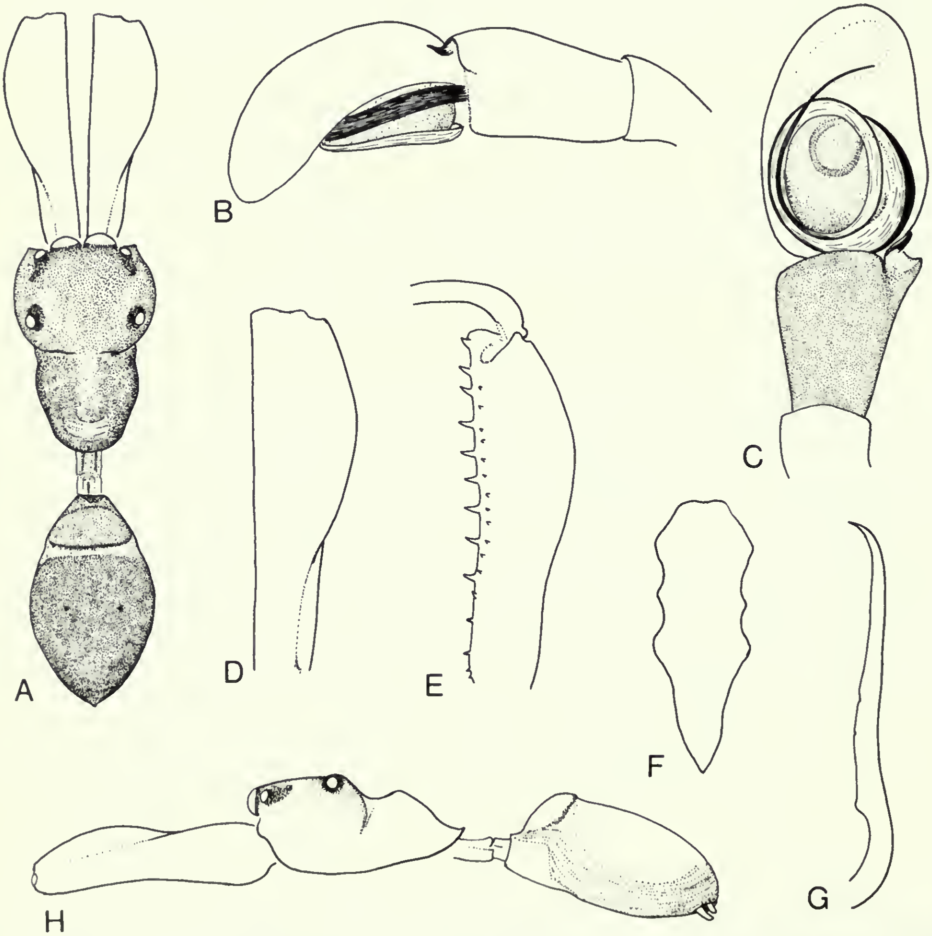

Fig. 17 *Myrmarachne eidmanni* Roewer. ♂ from Ghana: (A) dorsal view; (B) palp, lateral view; (C) palp, ventral view; (D) chelicera, dorsal view; (E) chelicera, ventral view; (F) sternum; (G) fang; (H) lateral view.

Myrmarachne eidmanni Roewer

(Fig. 17A–H)

Myrmarachne eidmanni Roewer, 1942 : 252, figs 8a, b–c, ♂ LECTOTYPE ♂ (here designated), Fernando Po, Musola (FS, Frankfurt am Main) [Examined]. Roewer, 1954 : 942; 1965 : 75, fig. 37. Prószyński, 1971b : 437.

Myrmarachne punctata Wanless & Clark, 1975 : 290, figs 29–35, ♂. Holotype ♂ Ivory Coast, Zepreghe, Dalao (MRAC, Tervuren) [Examined]. **Syn. n.**

DIAGNOSIS. *M. eidmanni* is distinguished from other species in the *tristis*-group by the combination of club-shaped chelicerae (Fig. 17A, D) and lack of a distal hook on the tibial apophysis (Fig. 17B). The form of the palp suggests that it is closely related to *M. luachimo* sp. n.

FEMALE. Unknown.

MALE. *Carapace* (Fig. 17A, H): punctured-reticulate; brown-black with a metallic sheen under some lights; sparsely clothed with whitish hairs forming very scanty, transverse bands on thoracic part with white haired bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 17D, E, G): rugulose with furrows, a metallic sheen proximally; orange-brown with black lateral keels; fang apophysis small. *Maxillae and Labium*: brown-black but inner margins of maxillae and labial tip lighter. *Sternum* (Fig. 17F): orange-brown tinged with black. *Abdomen* (Fig. 17A, H): mottled yellow-brown and black with shiny, dark brownish scuta; thinly clothed with very fine whitish hairs; posterior spinnerets darkest. *Legs*: slender; legs I tarsi light yellow; metatarsi black; tibiae and patellae pale yellow-brown with black streaks along inside; femora brownish with inner sides darker; trochanters and coxae yellow-brown with darker sides. Legs II as I but metatarsi yellow-brown. Legs III with tarsi and metatarsi pale yellowish, remaining segments brownish tinged with some black. Legs IV tarsi pale yellowish; metatarsi yellowish becoming brownish proximally; tibiae and femora brown suffused with black; patellae brown marked with yellowish; trochanters and coxae yellowish with dark sides. Ventral spination of legs I: metatarsi 2–2, tibiae variable from 0 to 2–2–2, patellae 0. *Palp* (Fig. 17B, C): distal hook lacking; flange moderately developed; proximal ectal margin of cymbium slightly depressed, scantily fringed with fine setae.

Dimensions: total length 2·90–4·10 mm, carapace length 1·5–1·99 mm. *Ratios*: AM : AL, PM : PL: 7 : 3 : 1 : 3·6, AL–PM–PL: 6–8; a: 0·87–1·0, b: 0·93–1·0, c: 0·40–0·42, d: 0·79–1·20 e: 0·62–0·65 (9♂ examined).

BIOLOGY. Unknown but the abdominal shape suggests that this species mimics *Crematogaster* ants.

DISTRIBUTION. Fernando Po, Ghana, Ivory Coast, Zaire.

MATERIAL EXAMINED. Type data given in synonymy. GHANA: Kade, pyrethrum knockdown sample from a plot of Amelonado cocoa, 3♂, 24.ii.1971, 2♂, 10.ii.1971, 1♂, 23.ii.1972 (*J. D. Majer*) (BMNH). ZAIRE: Kivu, Muwe Valley, Ruindi Plain, 1100 m, 1♂, 22.vi.1972 (*R. P. M. Lejeune* MT 144.469) (MRAC, Tervuren).

Myrmarachne natalica Lessert

(Fig. 18A–E)

Myrmarachne natalica Lessert, 1925 : 344, fig. 11, ♀. Holotype ♀, South Africa, Natal, Amanzimtoti (NM, Pietermaritzburg) [Examined]. Roewer, 1954 : 943. Bonnet, 1957 : 3010. Roewer, 1965 : 70. Prószyński, 1971b : 439.

DIAGNOSIS. *M. natalica* is a distinctive species easily recognized by the unusually long thorax. Its affinities are uncertain but the structure of the epigyne suggests that it may be related to *M. insulana* Roewer. However, without the male, any conclusions on this species must be regarded as tentative.

MALE. Unknown.

FEMALE. *Carapace* (Fig. 18A, E): punctured-reticulate; dark brownish orange with scattered, fine white hairs and white haired bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: white haired. *Chelicerae*: rugulose to smooth; orange, shiny; promargin with 6 or 7 teeth, retromargin with 8 or 9. *Maxillae and Labium*: brownish with inner distal margin of maxillae and labial tip paler. *Sternum* (Fig. 18B): dark brownish. *Pedicel*: rather long, segments subequal. *Abdomen* (Fig. 18A, E): mottled brownish black, a very scanty white haired band in constricted region. *Legs*: rather long and slender. Legs I tarsi and metatarsi yellowish; tibiae, patellae and femora light brown with black streaks along sides; trochanters and coxae whitish yellow. Legs II missing but coxae dark brown. Legs III tarsi and metatarsi yellow-brown; tibiae brownish orange; patellae brownish orange marked with yellowish; remaining segments brownish. Legs IV as III but trochanters yellowish and metatarsi orange-brown. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 0. *Epigyne* (Fig. 18C, D): lateral pouches apparently contiguous; spermathecae relatively complex.

Dimensions: total length 7·5 mm, carapace length 3·32 mm. *Ratios*: AM : AL : PM : PL: 11 : 5 : 1·5 : 5, AL–PM–PL: 6–7; a: 1·04, b: 1·04, c: 0·28, e: 0·98 (1 ♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. South Africa.

MATERIAL EXAMINED. Holotype ♀, data given in synonymy.

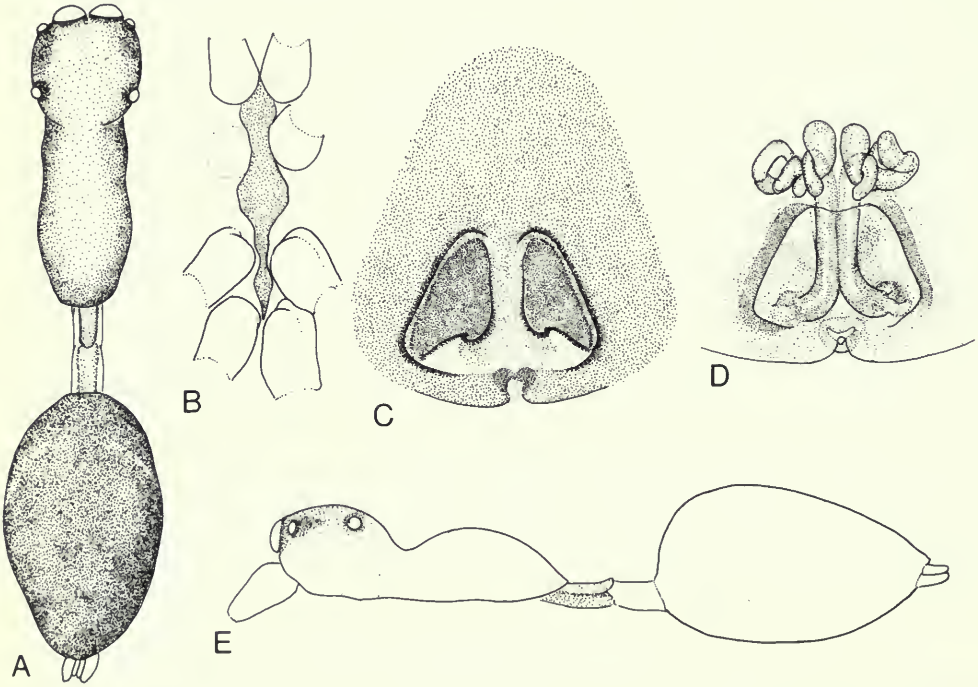

Fig. 18 *Myrmarachne natalica* Lessert. Holotype ♀: (A) dorsal view; (B) sternum; (C) epigyne, ventral view; (D) vulva, ventral view; (E) lateral view.

Myrmarachne insulana Roewer

(Fig. 19A, B, C, F)

Myrmarachne insulana Roewer, 1942 : 254, pl. 19, figs 10a–e, ♀. Holotype ♀, Fernando Po, Musola (FS, Frankfurt am Main) [Examined]. Roewer, 1954 : 943; 1965 : 75. Prószyński, 1971b : 438.

DIAGNOSIS. *Myrmarachne insulana* is a long slender species (Fig. 19A) closely related to *M. mussungue* sp. n., from which it may be distinguished by the shorter seminal ducts (Fig. 19C, F).

MALE. Unknown.

FEMALE. *Carapace* (Fig. 19A, B): finely punctured-reticulate; dark orange-brown with white haired bands in constriction. *Eyes*: anteriors contiguous with apices procurved, fringed with white hairs. *Clypeus*: sparsely white haired. *Chelicerae*: rugulose; orange-brown, shiny; promargin with 7 or 8 teeth, retromargin with 7–10. *Maxillae and Labium*: orange-brown but inner distal margin of maxillae and labial tip paler. *Sternum*: elongate, narrow; orange-brown with darker margins. *Abdomen* (Fig. 19A): yellow-brown tinged with grey with a lighter central band and a dark brownish patch anteriorly. *Legs*: slender; legs I yellow-brown with blackish streaks on sides of metatarsi, tibiae, patellae and femora. Legs II yellow-brown. Legs III as II but outside of femora, trochanters and coxae blackish. Legs IV as III but sides of tibiae and inside of femora blackish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 0. *Epigyne* (Fig. 19C, F): lateral pouches more or less contiguous; spermathecae complex; proximal seminal ducts moderately slender but not extending much beyond the lateral pouches.

Dimensions: total length 5·12–6·8 mm, carapace length 1·92–2·44 mm. *Ratios*: AM : AL : PM : PL: 8·5 : 4·5 : 1 : 4·5, AL–PM–PL: 5·5–6; a: 1·02–1·05, b: 1·02–1·05, c: 0·37–0·39, e: 0·72–0·75 (3 ♀ examined).

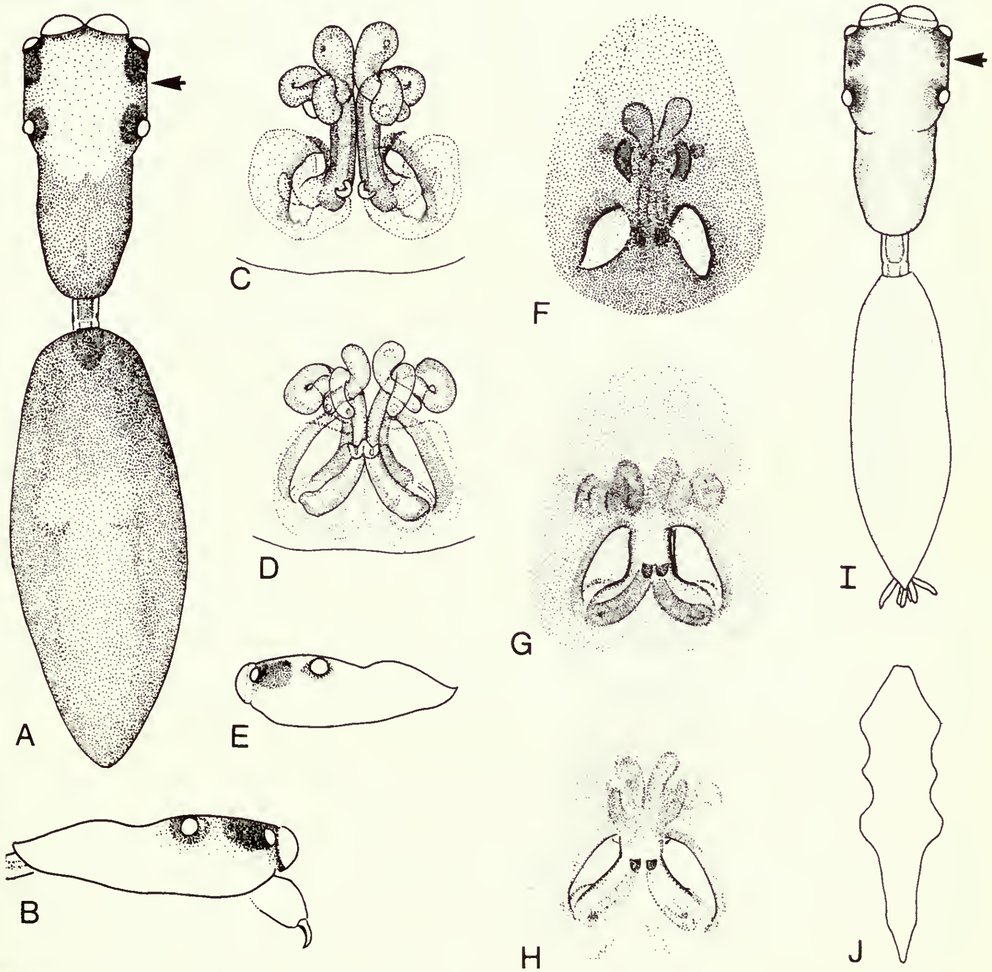

Fig. 19 (A, B, C, F) *Myrmarachne insulana* Roewer. Holotype ♀: (A) dorsal view; (B) carapace, lateral view; (C) vulva, ventral view; (F) epigyne, ventral view. (D, E, G–J) *Myrmarachne mussungue* sp. n. Holotype ♀: (D) vulva, ventral view; (E) carapace, lateral view; (H) epigyne, ventral view; (I) dorsal view; (J) sternum. Paratype ♀: (G) epigyne, ventral view.

BIOLOGY. Unknown but this species has been found with *Tetramorium* ants.

DISTRIBUTION. Fernando Po, Ghana.

MATERIAL EXAMINED. Holotype ♂, data given in synonymy. GHANA: Mt Atewa, primary forest with *Tetramorium* ants 1 ♀, 2.vi.1973 (*M. Edmunds*, vial 4) (BMNH); Kade, pyrethrum knockdown sample from a plot of Amelonado cocoa, 1 ♀, 21.iv.1971 (*J. D. Majer*) (BMNH).

Myrmarachne mussungue sp. n.

(Fig. 19D, E, G–J)

DIAGNOSIS. *Myrmarachne mussungue* is a long slender species (Fig. 19I) closely related to *M. insulana* Roewer from which it may be separated by the longer seminal ducts (Fig. 19D, G, H).

MALE. Unknown.

FEMALE. *Carapace* (Fig. 19I, E): finely punctured reticulate; light orange with white haired band in constriction. *Eyes*: anteriors contiguous with apices procurved, fringed with white hairs. *Clypeus*: sparsely fringed with light brown hairs. *Chelicerae*: finely rugulose; light orange, shiny; groove with 7 teeth on each margin. *Maxillae and Labium*: yellow-orange with inner distal margin of maxillae and labial tip paler. *Sternum* (Fig. 19J): light yellow-orange. *Abdomen* (Fig. 19I): whitish yellow with a darker streak anteriorly. *Legs*: slender, whitish yellow. Ventral spination of legs I: metatarsi 2–2, tibiae 1–2–2–2–2, patellae 0. *Epigyne* (Fig. 19D, G, H): lateral pouches more or less contiguous; spermathecae complex; proximal seminal duct moderately slender and clearly reaching beyond the lateral pouches.

Dimensions: total length 4·8–6·0 mm, carapace length 2·28–2·24 mm. *Ratios*: AM : AL : PM : PL: 10·5 : 5 : 1 : 5, AL–PM–PL: 6·5–5·6; a: 1·03–1·04, b: 1·04–1·06, c: 0·39–0·40, e: 0·80–0·84 (2 ♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Angola.

MATERIAL EXAMINED. Holotype ♀, ANGOLA: Environs of Dundo, Source of R. Mussungue, collected with japanese umbrella, iii.1948 (*A. B. Machado*, Ang. 608.7) (MD, Dundo). Paratype ♀, Dundo 1953 (*A. B. Machado*, Ang. 11281.1) (BMNH).

ETYMOLOGY. The specific name is a noun in apposition taken from the region in which the holotype was collected.

Myrmarachne evidens Roewer

(Figs 20A, H, I; 21D, F, I; 22A, D)

Myrmarachne evidens Roewer, 1965 : 53, fig. 52, ♂. Holotype ♂, Zaire, Mauda (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 437.

DIAGNOSIS. *M. evidens* is a very slender species characterized by the gentle thoracic slope (Figs 21D) and reduced flange (Fig. 22D). It is very closely related to *M. naro* sp. n. and *M. hesperia* Simon but may be distinguished by the shape and position of the flange (Fig. 22A, D).

FEMALE. Unknown.

MALE. *Carapace* (Figs 20A; 21D): finely punctured-reticulate; orange-brown with eye region lighter. *Eyes*: anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Figs. 20I; 21F, I): rather slender; rugulose with furrows: orange-brown; fang apophysis present. *Maxillae and Labium*: light orange. *Sternum* (Fig. 20H): light orange. *Abdomen* (Figs 20A; 21D): yellow-brown; scuta light orange, the posterior one obscurely marked with a blackish chevron. *Legs*: slender; yellow-brown with metatarsi I brownish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 0. *Palp* (Fig. 22A, D): tibial apophysis long and slender with distal hook; flange set midway along tibia and apparently reduced to a small lobe (i.e. in lateral view); basal ectal margin of cymbium depressed and fringed with stout setae.

Dimensions: total length 5·6–6·0 mm, carapace length 2·26–2·42 mm. *Ratios*: AM : AL :

PM : PL: 10·5 : 5 : 1 : 5; AL–PM–PL: 7–6·5; a: 1·05, b: 0·98, c: 0·38, d: 0·82–0·90, e: 0·80 (2♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Zaire.

MATERIAL EXAMINED. Holotype ♂, data given in synonymy. Paratype ♂, ZAIRE, Abimva, vi.1925 (*H. Schouteden*, MT 31277) (MRAC, Tervuren).

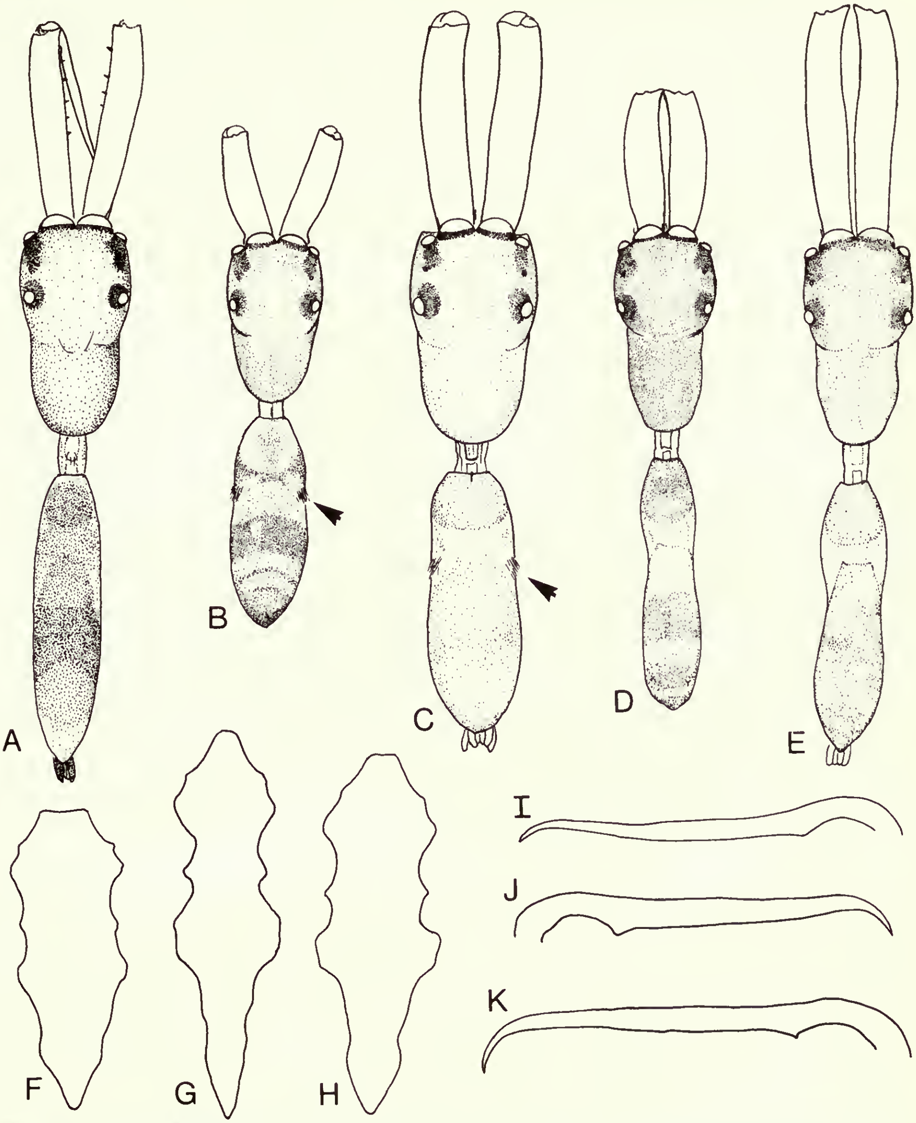

Fig. 20 (A, H, I) *Myrmarachne evidens* Roewer. Holotype ♂: (A) dorsal view; (H) sternum; (I) Fang. (B, C, F, K) *Myrmarachne naro* sp. n. Paratype ♂: (B) dorsal view. Holotype ♂: (C) dorsal view; (F) sternum; (K) fang. (D, E, G, J) *Myrmarachne hesperia* (Simon). ♂ from Ghana: (D) dorsal view; (G) sternum; (J) fang. Lectotype ♂: dorsal view.

Myrmarachne naro sp. n.

(Figs 20B, C, F, K; 21B, E, G, J; 22B, E, J)

DIAGNOSIS. *M. naro* is a slender species with little tufts of white hair in the abdominal constriction. It is very closely related to *M. hesperia* Simon and *M. evidens* Roewer but may be distinguished by the shape and position of the flange (Fig. 22E, G) and somewhat heavier carapace (Fig. 20B, C).

FEMALE. Unknown.

MALE. *Carapace* (Figs 20B, C; 21B, E): finely punctured-reticulate; yellowish orange with very scattered light brown hairs. *Eyes*: anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: white haired. *Chelicerae* (Figs 20K; 21G, J): finely rugulose with furrows; yellow-brown with dark brown lateral keels, shiny; fang apophysis present. *Maxillae and Labium*: yellow-brown, shiny; labium a shade darker. *Sternum* (Fig. 20F): yellow-brown tinged with black. *Abdomen* (Figs 20B, C; 21B): yellow-brown tinged with black; scuta yellowish orange with brown-black bands; sparsely clothed with fine golden hairs with white haired tufts in constriction. *Legs*: slender; legs I tarsi light yellow-brown; metatarsi brown-black; remaining segments light yellow-brown but with blackish on sides of tibiae, patellae and femora. Legs II and III light yellow-brown. Legs IV as III but some darkening on femora, patellae and tibiae. Ventral spina-

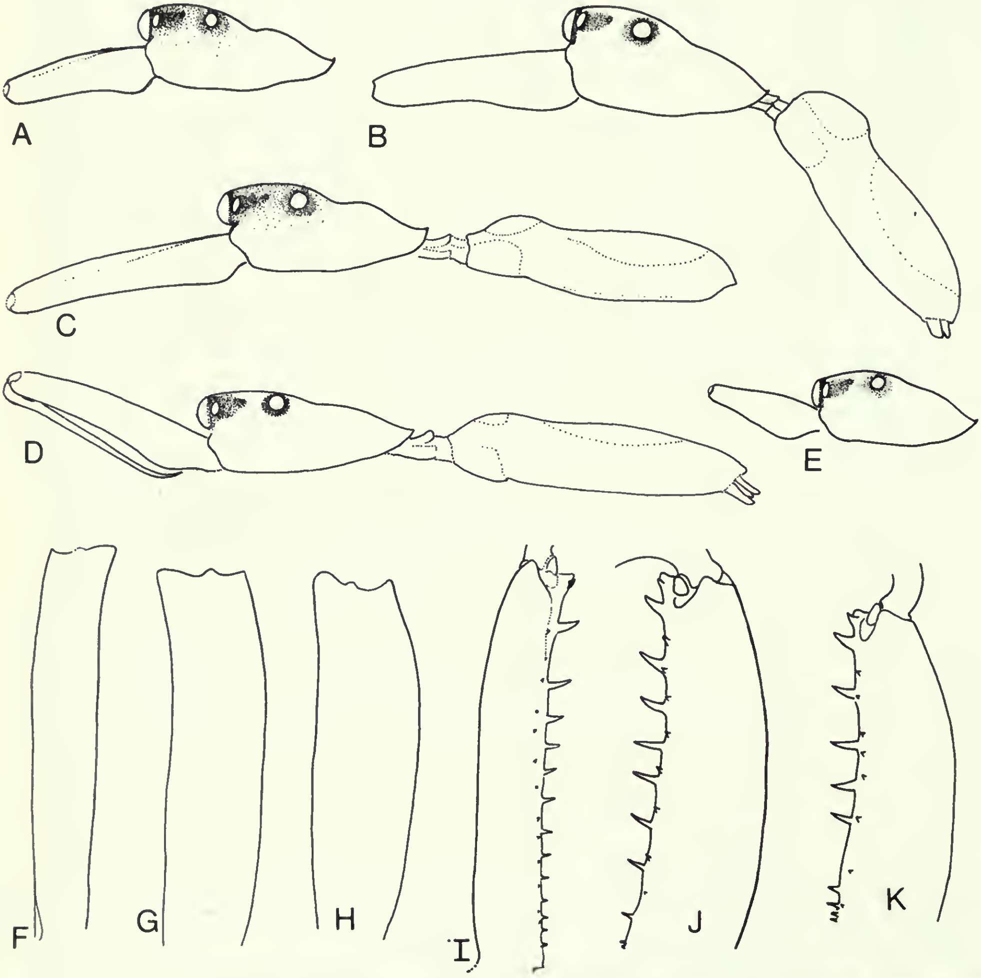

Fig. 21 (A, C, H, K) *Myrmarachne hesperia* (Simon). ♂ from Ghana: (A) carapace, lateral view; (H) chelicera, dorsal view; (K) chelicera, ventral view. Lectotype ♂: (C) lateral view. (B, E, G, J) *Myrmarachne naro* sp. n. Holotype ♂: (B) lateral view; (G) chelicera, dorsal view; (J) chelicera, ventral view. Paratype ♂: (E) carapace, lateral view. (D, F, I) *Myrmarachne evidens* Roewer. Holotype ♂: (D) lateral view; (F) chelicera dorsal view; (I) chelicera, ventral view.

tion of legs I: metatarsi 2–2, tibiae 2–2–1 or 2–2–2–2, patellae 0. *Palp* (Fig. 22B, E, G): tibial apophysis long and slender with distal hook; flange set, distally on tibiae, well developed; proximal ectal margin of cymbium depressed, fringed with stout setae.

Dimensions: total length 4·2–5·0 mm, carapace length 1·78–2·18 mm. *Ratios*: AM : AL : PM : PL: 7·5 : 4 : 1 : 4, AL–PM–PL: 5·5–5·5. a: 0·96–1·04, b: 1·0, c: 0·42, d: 0·61–0·97, e: 0·77–0·79 (2♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Kenya.

MATERIAL EXAMINED. Holotype ♂ and paratype ♂, Kenya, Naro Moru, 2000 m, swept from bushes and vegetation by the side of the river, 17.viii.1974 (*J. & F. Murphy*, vial 4245) (BMNH, reg. no. 1977.4.21.32).

ETYMOLOGY. The specific name is a noun in apposition taken from the type-locality.

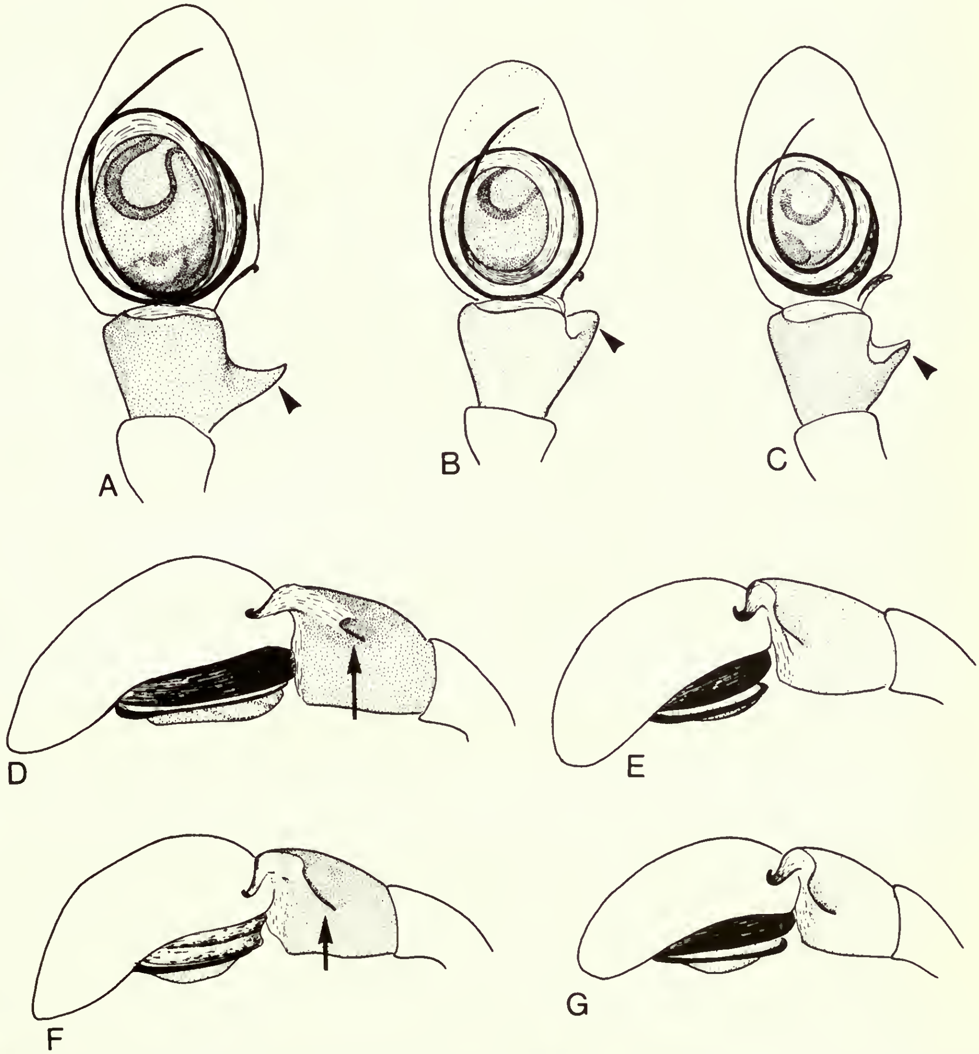

Fig. 22 (A, D) *Myrmarachne evidens* Roewer. Holotype ♂: (A) palp, ventral view; (D) palp, lateral view. (B, E, G) *Myrmarachne naro* sp. n. Holotype ♂: (B) palp, ventral view; (E) palp, lateral view. Paratype ♂: (G) palp, lateral view. (C, F) *Myrmarachne hesperia* (Simon). ♂ from Ghana: (C) palp, ventral view; (F) palp, lateral view.

Myrmarachne hesperia (Simon)

(Figs 20D, E, G, J; 21A, C, H, K; 22C, F)

Salticus hesperius Simon, 1887 : 261, ♂. LECTOTYPE ♂ (here designated), Ivory Coast, Assinie (MNHN, Paris) [Examined].

Myrmarachne hesperia (Simon): Simon, 1901 : 498. Roewer, 1954 : 943. Bonnet, 1957 : 3006. Roewer, 1965 : 74, fig. 54.

[*Myrmarachne hesperius*: Fage 1927 : 636, ? Misidentification.]

Myrmarachne chelata Wanless & Clark, 1975 : 294, figs 36–43, ♂. Holotype ♂, Ivory Coast, Bingerville (MRAC, Tervuren) [Examined]. **Syn. n.**

From an examination of material in the Paris Museum it is apparent that Simon consistently misidentified *M. elongata* Szombathy as *M. hesperia* (Simon). Simon (1910) and Berland & Millot (1941) refer to *M. elongata* but the identity of the specimens examined by Fage (1927) is uncertain. Roewer (1965) examined the type-specimen of *M. hesperia* (Simon) but did not comment on its affinities and evidently did not make comparisons with other specimens in the Simon collection but merely listed locality records of Simon and Berland & Millot.

DIAGNOSIS. *M. hesperia* is a long, slender species, very closely related to *M. evidens* Roewer and *M. naro* sp. n. but may be distinguished by the weak, ventral scutum and position of the flange (Fig. 22F). It resembles in general body form *M. elongata* but is readily distinguished by the structure of the palp.

FEMALE. Unknown but could belong with *M. insulana* Roewer.

MALE. *Carapace* (Fig. 20D, E; 21A, C): punctured-reticulate; orange-brown; sparsely clothed with white hairs forming very scanty, transverse bands on thoracic part with white wedge-shaped bands in constriction. *Eyes*: anteriors contiguous with apices procurved, fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Figs 20J; 21H, K): rugulose with furrows; orange-brown with blackish lateral keels; fang apophysis present. *Maxillae and Labium*: orange-brown tinged with some black, labium sometimes darker. *Sternum* (Fig. 20G): light orange-brown tinged with black. *Abdomen* (Figs 20D, E; 21C): mottled yellow-brown and black; dorsal scuta dark orange-brown tinged with some black with blackish markings; ventral scutum rather weak, orange-brown. *Legs*: slender; legs I yellow-brown with metatarsi and sides of femora blackish. Legs II yellow-brown. Legs III yellow-brown but sides of femora, trochanters and coxae blackish. Legs IV as III but patellae marked with blackish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 0. Femoral spines lacking. *Palp* (Fig. 22C, F): tibial apophysis long, slender and distally hooked; flange well developed, positioned medially; proximal depression fringed with stout setae.

Dimensions: total length 5·40–6·2 mm, carapace length 2·10–2·4 mm. *Ratios*: AM : AL : PM : PL: 10 : 5 : 1 : 5, AL–PM–PL: 6–6·4; a: 1·02–1·04, b: 1·0–1·04, c: 0·37–0·41, d: 0·76–0·90, e: 0·73–0·78 (5♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Ivory Coast, Ghana.

MATERIAL EXAMINED. Type data given in synonymy. GHANA: Tafa, pyrethrum knockdown, 3♂, ix.1966 (*Gibbs*) (BMNH).

Myrmarachne confusus sp. n.

(Fig. 23A–H)

The holotype of this species was labelled '*Myrmarachne nexilis*' by Simon and it is possibly the paralectotype of that species.

DIAGNOSIS. *Myrmarachne confusus* clearly shows affinities with *M. evidens* Roewer and *M. hesperia* (Simon) but is easily distinguished by the club-shaped chelicerae (Fig. 23C).

FEMALE. Unknown.

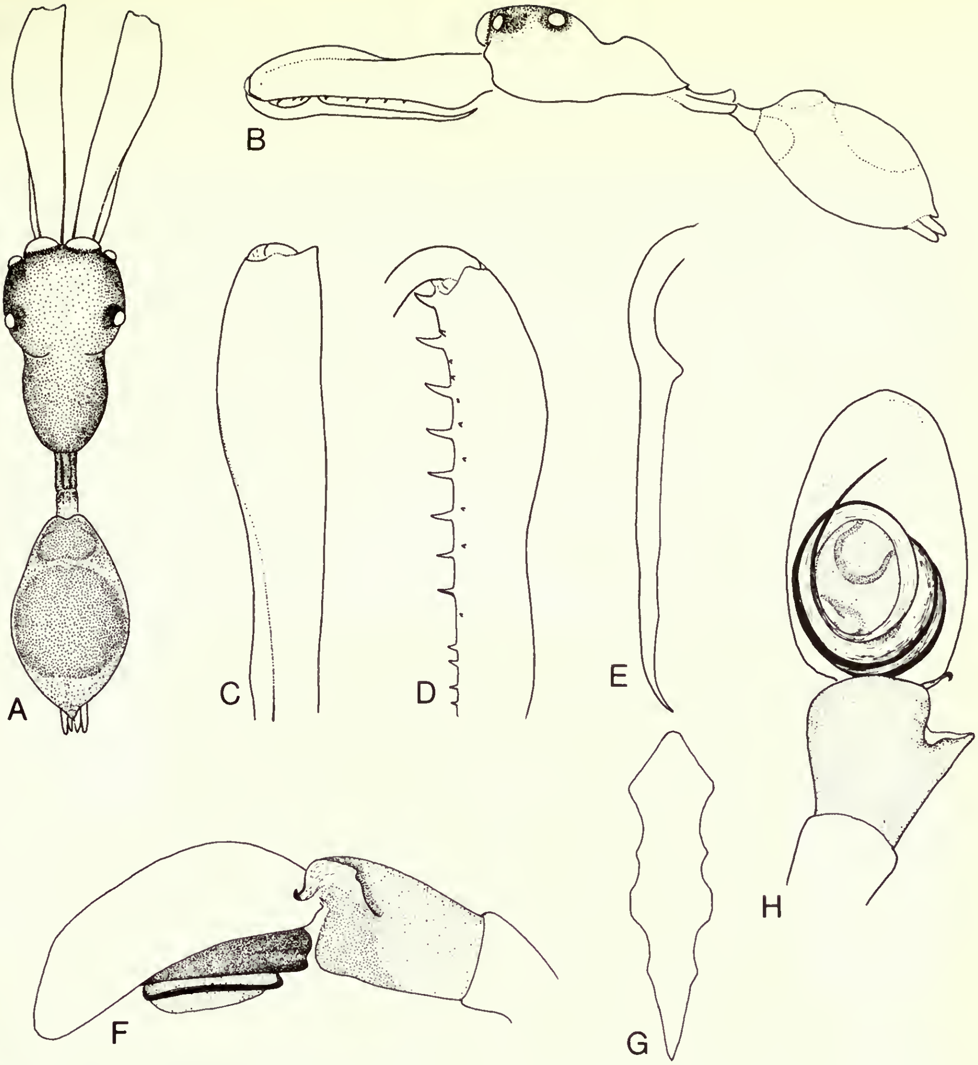

Fig. 23 *Myrmarachne confusus* sp. n. Holotype ♂: (A) dorsal view; (B) lateral view; (C) chelicera, dorsal view; (D) chelicera, ventral view; (E) fang; (F) palp, lateral view; (G) sternum; (H) palp, ventral view.

Male. *Carapace* (Fig. 23A, B): punctured-reticulate; orange-brown with white, wedge-shaped bands in constriction and very scanty, transverse, white haired bands on thoracic part. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 23C, D, E): rugulose with furrows; dark reddish brown; fang apophysis present. *Maxillae and Labium*: orange-brown, labium darker. *Sternum* (Fig. 23G): orange-brown. *Abdomen* (Fig. 23A, B): mottled yellow-brown and black; scuta orange-brown tinged with black, shiny with fine scattered hairs. *Legs*: slender; legs I tarsi yellow-brown; metatarsi yellow-brown tinged with black; tibiae, patellae femora and trochanters yellow-brown with blackish sides; coxae orange-brown. Legs II yellow-brown but inside of femora blackish and coxae orange-brown. Legs III orange-brown grading to yellow-brown on distal segments. Legs IV as III but patellae, trochanters and coxae marked with yellowish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 0. *Palp* (Fig. 23F, H): slightly variable and not distinguishable with certainty from *M. hesperia*.

Dimensions: total length 4·76–4·9 mm, carapace length 1·96–2·2 mm. *Ratios*: AM : AL :

PM : PL: 11 : 5 : 1 : 5, AL–PM–PL: 5·5–5·5; a: 1·03, b: 1·02, c: 0·38–0·39, d: 0·64–1·01, e: 0·71–0·74 (2♂ examined).

A male from Angola has a more slender body form the chelicera are relatively shorter (i.e. ratio d) and the flange is set slightly further back on the tibiae.

Biology. Unknown.

Distribution. Angola, São Thomé.

Material examined. Holotype ♂, São Thomé (MNHN, Paris). Paratype ♂, Angola Parque Carrisso, 10.ix.1960 (*A. B. Machado*, Ang. 15655) (BMNH).

Etymology. The specific name refers to the fact that the holotype was formally confused with *M. nexilis* in the Simon collection, Paris (see *B. nexilis* p. 9).

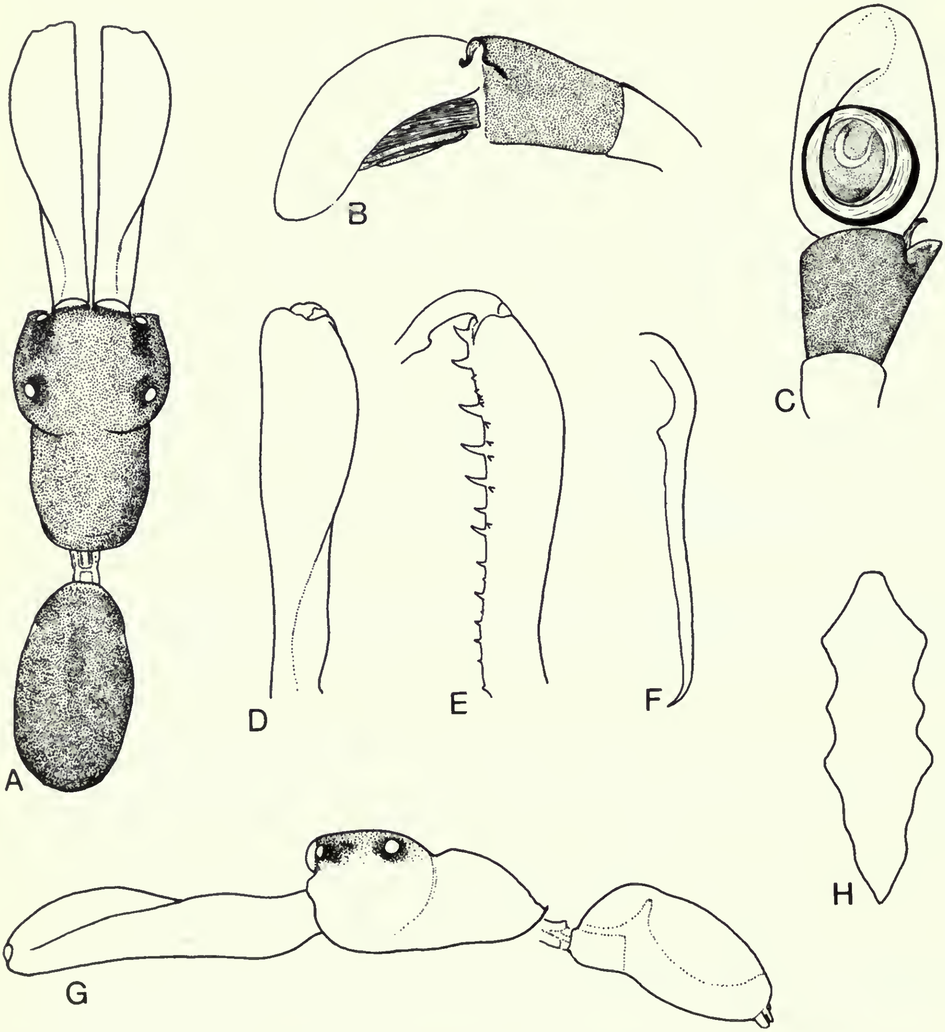

Fig. 24 *Myrmarachne collarti* Roewer. Holotype ♂: (A) dorsal view; (B) palp, lateral view; (C) palp, ventral view; (D) chelicera dorsal view; (E) chelicera ventral view; (F) fang; (G) lateral view; (H) sternum.

Myrmarachne collarti Roewer

(Fig. 24A–H)

Myrmarachne collarti Roewer, 1965 : 54, fig. 55, ♂. Holotype ♂, Zaire, Stanleyville (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 437.

DIAGNOSIS. *Myrmarachne collarti* is a species of uncertain affinities. It resembles *M. confusus* sp. n. in body form and cheliceral shape but can be readily separated by the structure of the palp (Fig. 24B, C).

FEMALE. Unknown.

MALE. *Carapace* (Fig. 24A, G): punctured-reticulate; brown-black with a violet sheen and whitish, wedge-shaped bands in constriction; sparsely clothed with fine whitish hairs. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 24D, E, F): finely rugulose with furrows; brown-black; fang apophysis present. *Maxillae and Labium*: brown-black but inner margin of maxillae and labial tip paler. *Sternum* (Fig. 24H): dark orange-brown. *Abdomen* (Fig. 24A, G): mottled orange-brown and black; scuta contiguous, dark mahogany, sparsely clothed with fine whitish hairs. *Legs*: slender; legs I tarsi and metatarsi dark brownish orange; tibiae and patellae light orange-brown with blackish sides; remaining segments dark brownish orange. Legs II similar to I but tarsi and metatarsi light orange-brown. Legs III tarsi and metatarsi light orange-brown; other segments orange-brown. Legs IV as III but trochanters and patellae marked with yellow-brown. Ventral spination

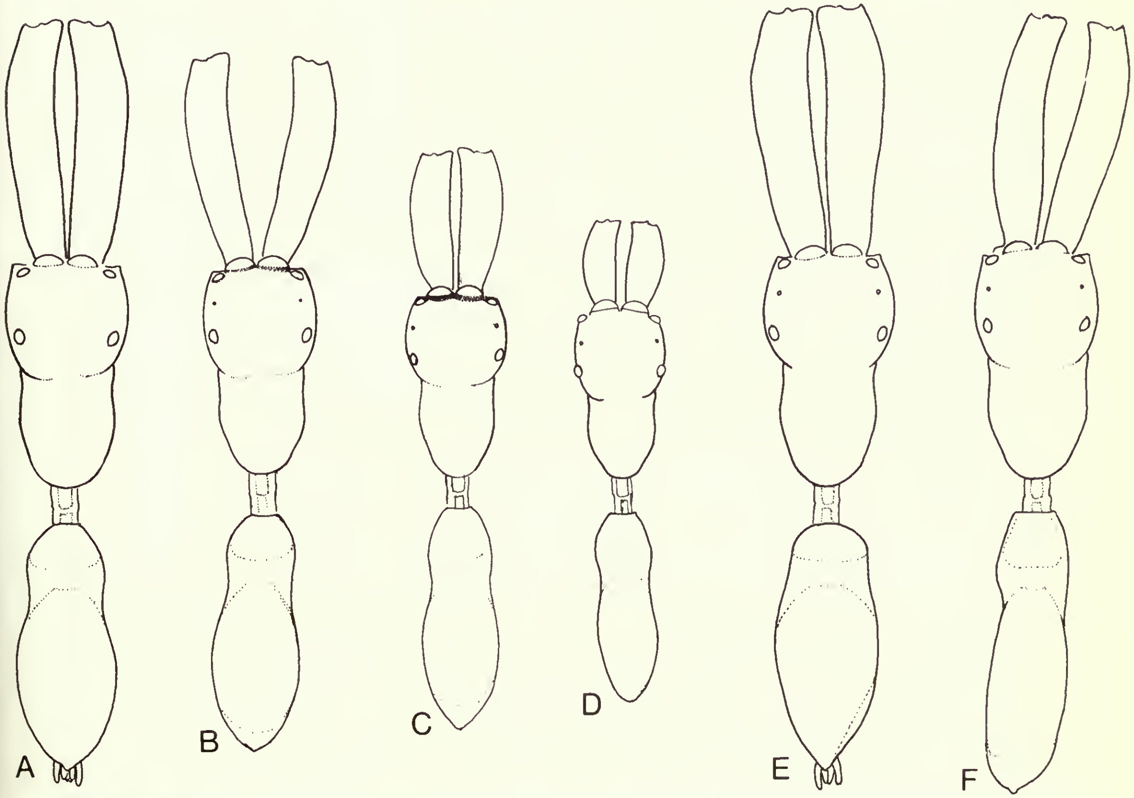

Fig. 25 *Myrmarachne elongata* Szombathy, drawn to scale. (A–D) 4 males, showing allometric growth, from a series of 11 males from Sierra Leone. (E) ♂ from Ivory Coast misidentified as *M. hesperia* (Simon) by Berland & Millot (1941 : 407). (F) holotype ♂ of *M. coppeti* Berland & Millot.

of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 0. *Palp* (Fig. 24B, C): tibial apophysis slender, distally hooked; flange relatively small; proximal depression fringed with stout setae.

Dimensions: total length 5·4 mm (abdomen of holotype missing), carapace length 2·24–2·68 mm. *Ratios*: AM : AL : PM : PL: 10 : 5 : 2 : 5; a: 0·82–0·93, b: 0·92–1·0, c: 0·38–0·40, d: 1·10–1·26, e: 0·74 (2♂ examined).

BIOLOGY. The holotype was accompanied by an ant *Odontomachus troglodytes* Santschi, an open woodland and savanna species, widespread in West and Central Africa.

DISTRIBUTION. Uganda, Zaire.

MATERIAL EXAMINED. Holotype ♂, data given in synonymy. UGANDA: Bugalla Isle, Lake Victoria 1♂, xii.1912 (*G. D. H. Carpenter*) (BMNH).

Myrmarachne elongata Szombathy

(Figs 25A–F; 26A–H; 27A–I; 28A–I)

[*Myrmarachne hesperius* (Simon): Simon, 1910 : 414, unjustified emendation. Misidentification.]

Myrmarachne elongata Szombathy, 1915 : 475, fig. 6, ♂. LECTOTYPE ♂ (here designated), Uganda, Mujenji (TM, Budapest) [Examined]. Roewer, 1954 : 942. Bonnet, 1957 : 3001. Roewer, 1965 : 45, fig. 34. Prószyński, 1971b : 437.

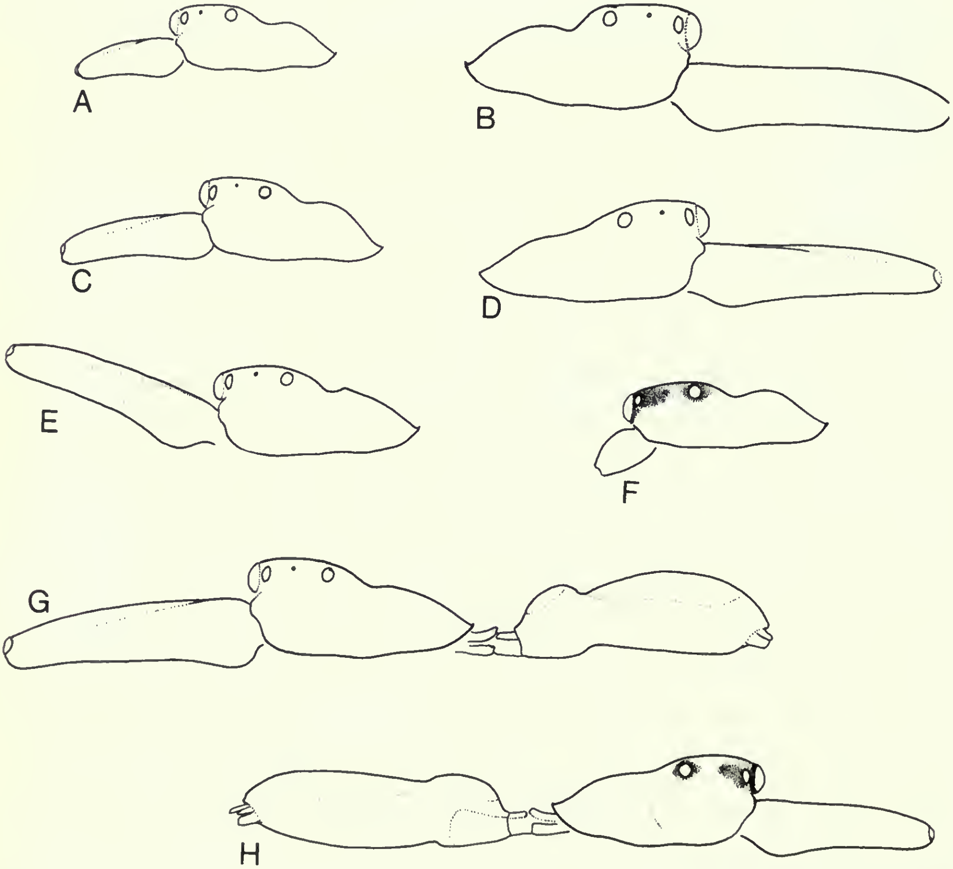

Fig. 26 *Myrmarachne elongata* Szombathy, drawn to scale. (A, C, E, G) 4 males, showing allometric growth, from a series of 11 males from Sierra Leone. (B) ♂ from Ivory Coast, misidentified as *M. hesperia* (Simon) by Berland & Millot (1941 : 407). (D) holotype ♂ of *M. coppeti* Berland & Millot. ♀ from Ibadan: (F) carapace, lateral view. Lectotype ♂: (G) lateral view. Lectotype ♂: (H) lateral view.

Myrmarachne coppeti Berland & Millot, 1941 : 405, figs 95, 101, ♂. Holotype ♂, Senegal, Dakar (MNHN, Paris) [Examined]. Roewer, 1954 : 942; 1695 : 73, fig. 53. **Syn n.**

[*Myrmarachne hesperia* (Simon): Berland & Millot, 1941 : 407, fig. 97. Misidentification.]

Myrmarachne faradjensis Roewer, 1965 : 48, fig. 36, ♂. Holotype ♂, Zaire, Faradje (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 437. **Syn. n.**

Myrmarachne atra Roewer, 1965 : 50, fig. 40, ♂. Holotype ♂, Zaire, Tembwe (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 436. **Syn. n.**

Myrmarachne abimvai Roewer, 1965 : 58, figs 61, 61a, ♂, ♀. Holotype ♂, Zaire, Abimva (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 436. **Syn. n.**

Myrmarachne dartevellei Roewer, 1965 : 58, fig. 62, ♂. Holotype ♂, Zaire, Matadi (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 438. **Syn. n.**

Myrmarachne kasaia Roewer, 1965 : 60, fig. 64, ♂. Holotype ♂, Zaire, Kasai S., Tshisika (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 438. **Syn. n.**

Myrmarachne moto Roewer, 1965 : 60, fig. 65, 65a, ♂, ♀. Holotype ♂, Zaire, Moto (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 439. **Syn. n.**

Myrmarachne elongata Szombathy is the first available name for this variable and widespread species. Judging from material in the Paris Museum, Simon consistently misidentified *M. elongata* Szombathy as *M. hesperia* (Simon), a morphologically similar but nevertheless distinct species.

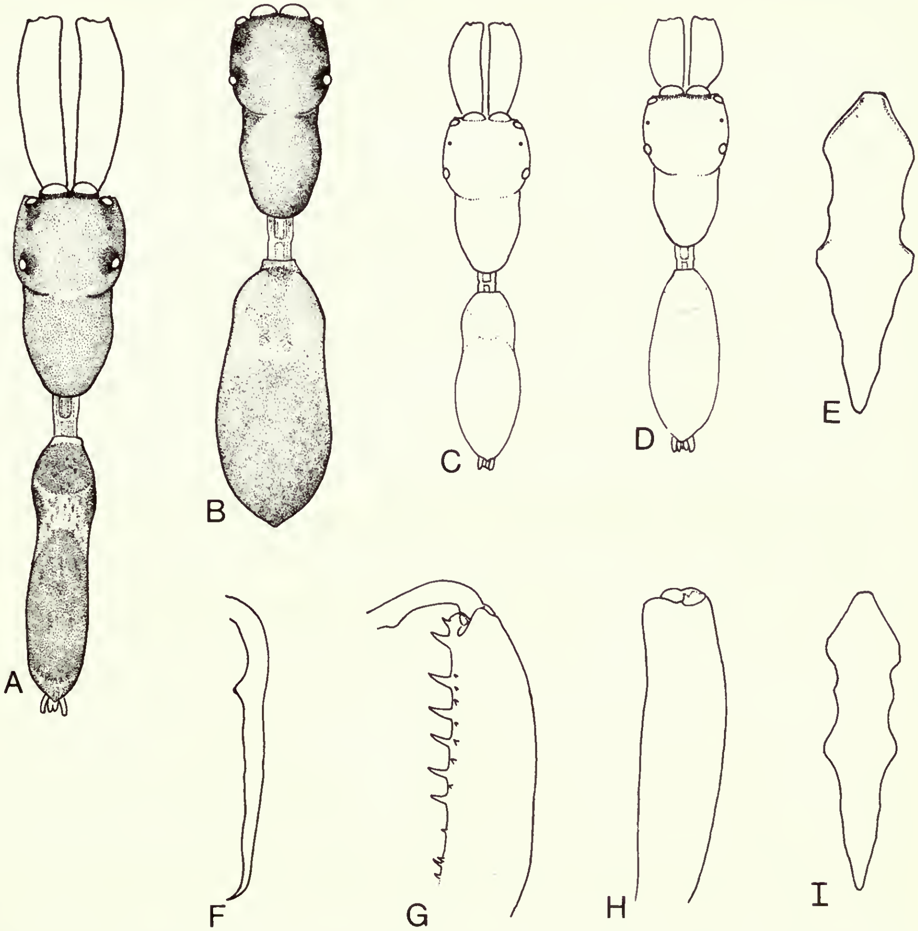

Fig. 27 *Myrmarachne elongata* Szombathy. Lectotype ♂: (A) dorsal view; (E) sternum; (F) fang; (G) chelicera, ventral view; (H) chelicera, dorsal view. ♀ from Ibadan: (B) dorsal view; (I) sternum. (C, D) dwarf males from Ghana, collected on different dates but from the same locality (i.e. tree).

Evidently Berland & Millot (1941) did not examine the type of *hesperia* because they too misidentified this species.

Roewer (1965) did not see the type of *elongata* but he proposed 6 new species which were separated by trivial characters (i.e. cheliceral length, state of abdominal constriction and number of ventral tibial spines on legs I) that are variable and of unreliable diagnostic value. Some of the male holotypes are in poor condition but all 6 species are considered to be conspecific with *elongata*. The paratype female of *M. abimva* Roewer certainly represents a new taxon but it is in poor condition and not described in this paper. Of two paratype females described under *M. moto* Roewer, one is conspecific with *elongata* and the other with *M. kiboschensis* Lessert.

DIAGNOSIS. *M. elongata* is a slender, elongate species which shows wide variations in size. It is distinguished from most other elongate species (i.e. *M. evidens* Roewer, *M. hesperia* (Simon) and *M. insulana* Roewer by the genitalia (Fig. 28A–I) and from the yellowish orange *M. ichneumon* (Simon) by its brown-black colour. It is closely related to *M. lulengensis* Roewer from which it is doubtfully separated by the palpal tibia (Fig. 28B–E) and by having the posterior part of the thorax more attenuate. Very small specimens (i.e. dwarf forms) may be confused with other, less slender, species which also exhibit dwarfism (i.e. *M. marshalli* Peckham & Peckham and *M. legon* sp. n.). However, *elongata* is separated by the more slender abdomen, scattered white hairs on the thorax, the three light-coloured spots on the cephalic part and dorsal femoral spines.

MALE. *Carapace* (Figs 25A–F; 26A–E, G, H; 27A, C, D): punctured-reticulate brown-black, usually with three light orange patches in constriction; sparsely clothed with white hairs with white, wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 27F, H): rugulose with furrows; orange-brown with blackish lateral keels; fang apophysis pronounced but less well developed in small specimens. *Maxillae and Labium*: yellow-brown suffused with black, labium sometimes darker. *Sternum* (Fig. 27E): orange-brown tinged with black. *Abdomen* (Figs 25A–F; 26G, H; 27A): mottled yellow-brown and black; scuta dark orange suffused with black; sparsely fringed with fine, whitish hairs. *Legs*: slender, legs I yellow-brown but tarsi and metatarsi tinged with black, with sooty streaks on sides of tibiae and patellae and on insides of femora, trochanters and coxae. Legs II similar to I but tarsi and metatarsi yellow-brown with sooty markings on outside of trochanters and coxae. Legs III orange-brown suffused with black but tibiae, metatarsi and tarsi yellow-brown. Legs IV as III but coxae, trochanters and patellae marked with light yellowish. Ventral spination of legs I: metatarsi 2–2, tibiae, usually 2–2–2–2, patellae 0. Femora usually with one or two dorsal or dorsolateral spines. *Palp* (Fig. 28A–E): tibiae variable in shape; tibial apophysis distally hooked. Flange moderately well developed; proximal depression fringed with stout setae.

Dimensions: total length 3·84–6·08 mm, carapace length 1·76–2·58 mm. *Ratios*: AM : AL : PM : PL: 9 : 4 : 1·2 : 4·5, AL–PM–PL: 5·5–7·5; a: 0·90–1·02, b: 0·92–1·02, c: 0·36–0·39, d: 0·47–1·12, e: 0·59–0·74 (10♂ examined).

FEMALE. *Carapace* (Figs 26F; 27B): punctured-reticulate; brown-black with scattered white hairs and white, wedge-shaped bands in constriction. *Eyes*: more or less as in ♂. *Clypeus*: fringed with light brownish hairs. *Chelicerae*: rugulose; light orange, shiny; promargin with 6 or 7 teeth, retromargin with 7 or 8. *Maxillae and Labium*: as in ♂. *Sternum*: as in ♂. *Abdomen* (Fig. 27B): yellow-brown suffused with black with a brownish patch anteriorly; clothed with fine, light brownish hairs with oblique, yellowish bands on the sides. *Legs*: slender; legs I tarsi and metatarsi yellow-brown tinged with black; tibiae and patellae yellow-brown with black streaks along the sides; femora light yellowish with black streaks outside and proximal streaks inside; trochanters and coxae light yellowish but with black streaks inside. Legs II as I but tarsi and metatarsi yellow-brown, femora with black distal streak only; trochanters and coxae light yellow but with blackish spot on coxae (sometimes lacking). Legs III orange-brown tinged with black but tarsi and metatarsi yellow-brown. Legs IV as III but metatarsi orange-brown, patellae and trochanters marked with yellowish. Ventral spination of legs I as in ♂ but femoral spines lacking. *Epigyne* (Fig. 28F–I): usually indistinct; lateral pouches small and separate; spermathecae simple, basic figure eight configuration but orientation slightly variable and configuration not always obvious.

Dimensions: total length 5·16–5·8 mm, carapace length 2·24–2·42 mm. *Ratios*: AM : AL : PM : PL: 8 : 4 : 1 : 4, AL–PM–PL: 5·5–6·5; a: 1·02, b: 1·02–1·04, c: 0·35–·037, e: 0·66–0·71 (10♀ examined).

Allometric growth is particularly well marked in males of this species, larger individuals having relatively larger chelicerae (Figs 25A–F; 26A–E, G, H) and lower values for ratios a and b. A series of males from Ghana shows individual variation in cheliceral shape (Fig. 27C, D) but the extent of individual variation among specimens of equal size cannot be adequately demonstrated from the samples at hand, although the forms described as *M. coppeti* Berland & Millot and *M. hesperia* (Simon) sensu Berland & Millot (1941) suggest that considerable variation in carapace shape will occur (Fig. 26B, D).

BIOLOGY. In Nigeria, frequent on shrubs and trees in fallow bush and secondary forest. Females are sometimes found spun-up in a small silken retreat in the fold of a leaf (A. Russell-Smith, pers. comm.).

Immatures and females are preyed upon by sphecid wasps. A sphecid nest of several cells collected in Ibadan, Nigeria, contained 26 immature specimens and 3 females of *M. elongata*.

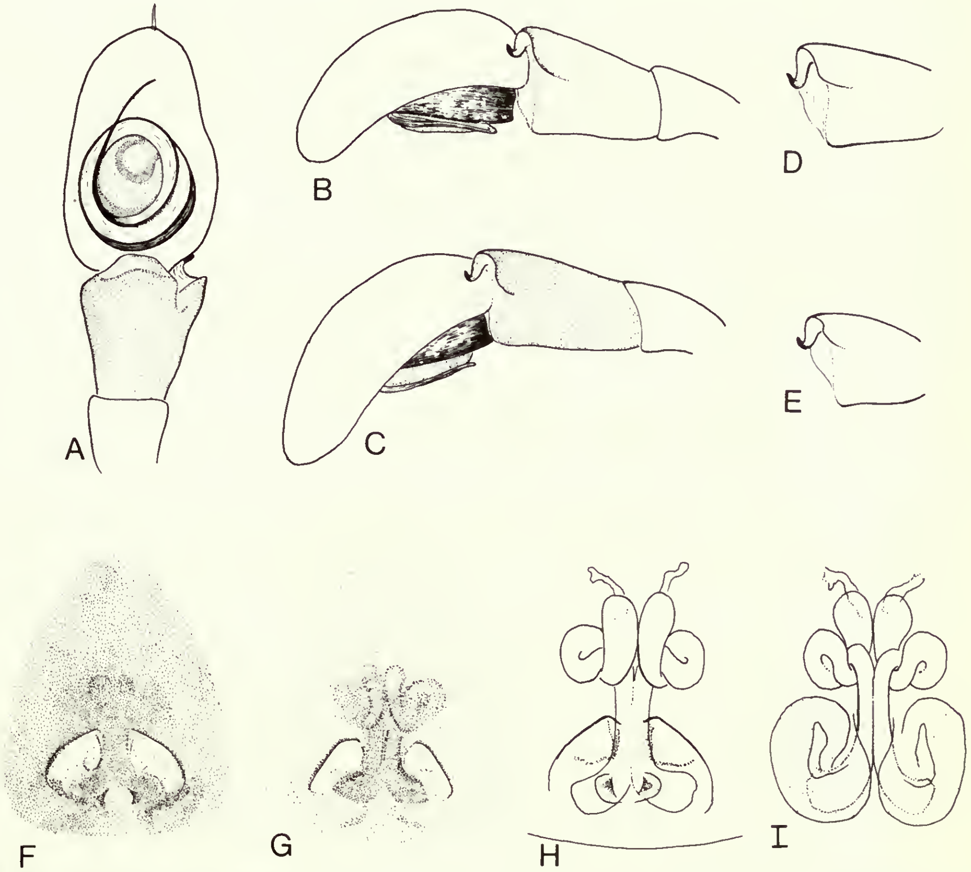

Fig. 28 *Myrmarachne elongata* Szombathy. Lectotype ♂: (A) palp, ventral view; (B) palp, lateral view. Holotype ♂ of *M. coppeti* Berland & Millot: (C) palp, lateral view. Males from Sierra Leone: (D) palpal tibiae from large ♂; (E) palpal tibiae from small ♂, drawn to scale. Females from Ibadan: (F) epigyne, ventral view; (G) epigyne of another specimen: (H) vulva, ventral view; (I) vulva, dorsal view.

Provisional studies on numerous *Pison* cells, collected by M. Edmunds in Ghana, shows that immatures and female *elongata* are heavily preyed upon, as most cells contained numerous specimens. Other genera also represented in the *Pison* nests included *Pseudicus*, *Telamonia* and *Cosmophasis*.

DISTRIBUTION. Angola, Ghana, Ivory Coast, Nigeria, São Thomé, Senegal, Sierra Leone, Uganda, Zaire.

MATERIAL EXAMINED. Type-data given in synonymy. ANGOLA: Dundo, in house at night time, 1♂, x.1948 (*A. B. Machado*, Ang. 1218); 1♂, x.1962 (*A. B. Machado*, Ang. 18155); Alto Cuflo, R. Cavuembal, with Japanese umbrella, 1♀, 4.vi.1954 (*A. B. Machado*, Ang. 4100.11) (BMNH). GHANA: Tafa, pyrethrum knockdown, 4♂, 5–9.ix.1966 (*Gibbs*); Bibiani, 1♂ (*H. Spurrell*); Legon, 1♂, 1973 (*M. Edmunds*, vial 3); Legon, with *Tetraponera anthracina* Santschi, 3♂, xi–i.1972/73 (*M. Edmunds*, vial 39) (BMNH). IVORY COAST: Danane, 1♂, viii.1937 (*J. Millot*); Man, 1♂ (*Berland & Millot*) (MNHN, Paris). NIGERIA: Ibadan, International Institute of Tropical Agriculture, Centre for Overseas Pest Research site (*A. Russell-Smith*), 2♀, 9.vi.71; 2♀, 18.iii.1974; 1♀, 13.vi.1973; fallow bush, 2♂, 28.viii.1974, 1♂, 3.ii.1974; secondary forest, 2♂, 10.xi.1974; in sphecid nest, 4♀, 22 immatures, 3.vi.1974 (BMNH). SÃO THOMÉ: North Coast, litter in savanna with baobab trees, 1♂, 8–10.x.1973 (*G. Schmitz*, MT 146337); Ecole Mesquita, 10 km from São Thomé, 100 m, 1♀, 10.xi.1973 (*G. Schmitz*, MT 146336) (MRAC, Tervuren). SIERRA LEONE: Freetown, 2♀, 11♂ (*A. Mocqueries*) (MNHN, Paris). UGANDA: Kampala, 1♂, 5.xii.1922 (BMNH). ZAIRE: Basongo, 1♂, vii.1927 (*H. Schouteden*, MT 31258); Bas-Congo, Singa-Kazu, 1♂, 26.ii.1924 (*J. Collart*, MT 130.767); Kasongo, 1♂, viii.1959 (*P. L. G. Benoit*, MT 114985) (MRAC, Tervuren).

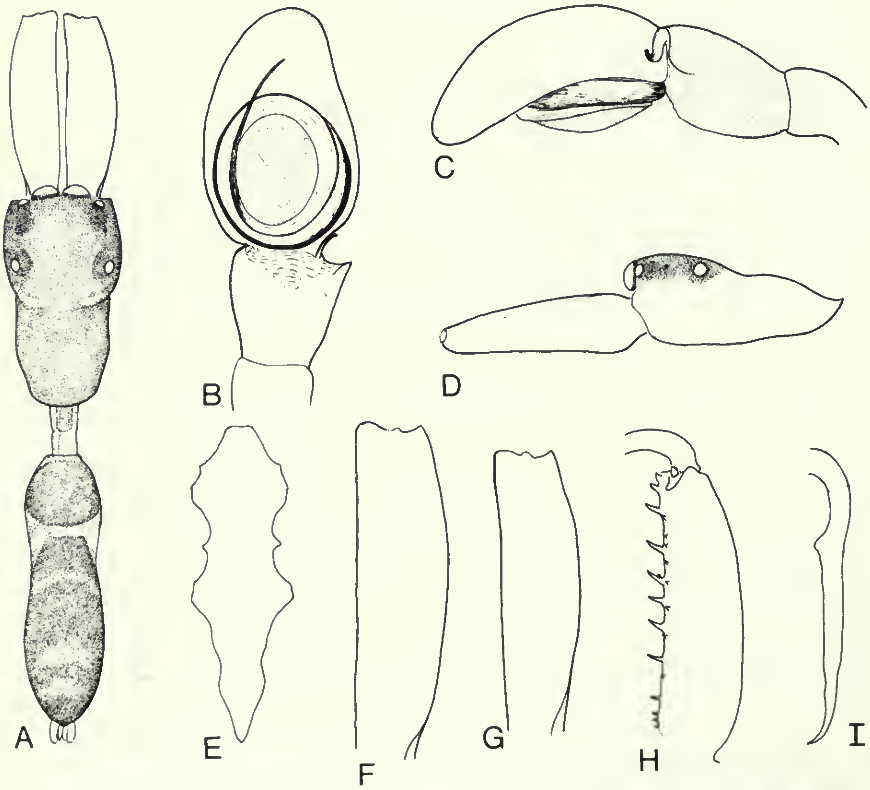

Fig. 29 *Myrmarachne lulengensis* Roewer. Holotype ♂: (A) dorsal view; (B) palp, ventral view; (C) palp, lateral view; (D) lateral view; (E) sternum; (G) chelicera, dorsal view; (H) chelicera ventral view; (I) fang. Holotype ♂ of *M. caheni* Roewer: (F) chelicera, dorsal view.

Myrmarachne lulengensis Roewer

(Fig. 29A–I)

Myrmarachne lulengensis Roewer, 1965 : 49, fig. 39, ♂. Holotype ♂, Zaire, Lulenga (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 439.

Myrmarachne caheni Roewer, 1965 : 61, fig. 67, ♂. Holotype ♂, Zaire, Boma (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 437. **Syn. n.**

The type-specimens of *M. lulengensis* and *M. caheni* are in poor condition, the abdomen of *lulengensis* is damaged and that of *caheni* is missing. A female abdomen in with the holotype of *caheni* belongs to *M. foenisex* Simon. Two other males from Zaire also have distorted abdomens and it is possible that the abdomen is broader than I have indicated in Fig. 29A.

DIAGNOSIS. *M. lulengensis* closely resembles *M. elongata* but the posterior part of the carapace is slightly more truncate and the inner keels of the chelicerae are straighter (Fig. 29F, G). The tibiae of the palps, when compared with equal-sized palps of *elongata*, are relatively shorter with the dorsal and ventral surfaces more curved; also the diameter of the tegulum and embolus is greater in relation to the cymbium (Fig. 29B). The distinction is, however, less evident when a comparison is made with the palps from smaller specimens of *elongata*. *M. lulengensis* appears to be a good species but it could equally well be a variant of *elongata*. Further collections from Zaire are needed to reach a satisfactory conclusion.

FEMALE. Unknown.

MALE. *Carapace* (Fig. 29A, D): punctured-reticulate; blackish orange with three light orange patches in constriction; sparsely clothed with whitish hairs with white, wedge-shaped bands in constriction. *Eyes*: subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 29F–I): rugulose with furrows; orange-brown with blackish lateral keels; fang apophysis present. *Maxillae and Labium*: orange-brown tinged with black but inner margins of maxillae lighter; labium sometimes darker with paler tip. *Sternum* (Fig. 29E): orange-brown tinged with black. *Abdomen* (Fig. 29A): mottled yellow-brown and black with shiny dark red-brown scuta; behind constriction a scanty, transverse, white-haired band. *Legs*: slender; legs I light orange-brown with dark brown metatarsi and sooty streaks along inside of tibiae and patellae. Legs II orange-brown. Legs III light orange-brown tinged with blackish. Legs IV as III but trochanters and patellae marked with yellowish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2, patellae 0 or 1. Femora with one or two dorsal or dorsolateral spines. *Palp* (Fig. 29B, C): tibial apophysis distally hooked; flange moderately well developed; proximal depression fringed with slender setae.

Dimensions: total length 6·0–6·4 mm, carapace length 2·28–2·72 mm. *Ratios*: AM : AL : PM : PL: 8·5 : 4 : 1 : 4·2, AL–PM–PL: 6·5–7; a: 0·84–0·90, b: 0·93–0·96, c: 0·36–0·38, d: 0·69–0·92, e: 0·66–0·71 (4♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Zaire.

MATERIAL EXAMINED. Type-data given in synonymy. ZAIRE: Nioka, 2♂, xii.1952 (*J. Hecq*, MT 74474–5) (MRAC, Tervuren).

Myrmarachne rufisquei Berland & Millot

(Fig. 30A–C)

Myrmarachne rufisquei Berland & Millot, 1941 : 411, figs 100, 101, ♂. Holotype ♂, Senegal, near Dakar (MNHN, Paris) [Examined, in part]. Roewer, 1954 : 944; 1965 : 72, fig. 49.

All that remains of the holotype is the left palp and the description given below is based on the original given by Berland & Millot (1941).

DIAGNOSIS. *M. rufisquei* is a distinctive species closely related to *M. elongata* Szombathy but can be readily separated by the dark submarginal bands on the thorax (Fig. 30A).

FEMALE. Unknown.

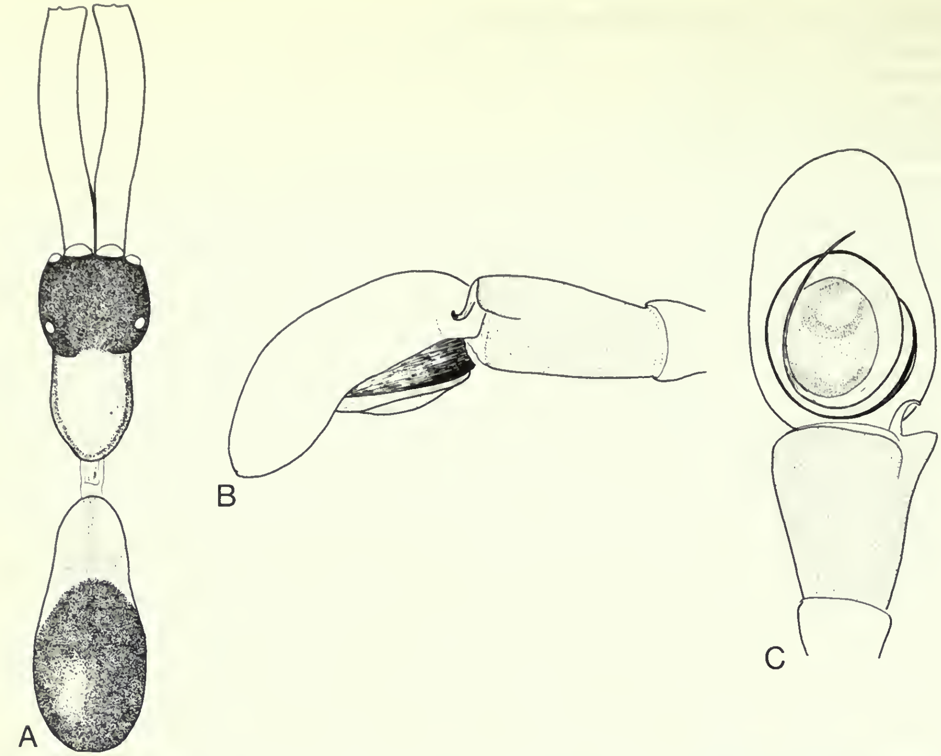

Fig. 30 *Myrmarachne rufisquei* Berland & Millot. Holotype ♂: (A) dorsal view (after Berland & Millot, 1941); (B) palp, lateral view; (C) palp, ventral view.

MALE. *Carapace* (Fig. 30A): fawnish red with top of head distinctly black, a brown submarginal band on the sides of the thorax; cuticle almost smooth (? pubescence lacking) with white wedge-shaped bands in constriction. *Chelicerae* (Fig. 30A): brownish orange with apex clear fawn; fangs olivaceous, fawnish clear at tip. *Abdomen*: dorsally with a grey stripe in its anterior third, the remainder deeper mouse grey; venter testaceous; spinnerets testaceous. *Legs*: pale yellow, the tarsus grey, a grey streak on the sides of some segments, notably the patellae, tibiae and metatarsi I (there also being grey below); femora and trochanters IV on anterior surface only; apices of patellae IV and base of tibiae IV grey. Ventral spination of tibiae I: 2–2–2. *Palp* (Fig. 30B, C): tibial apophysis long, distally hooked; flange well developed; proximal depression fringed with stout setae.

Dimensions: total length 8·7 mm, carapace length 2·6 mm. Ratio d: > 1·0.

BIOLOGY. Unknown.

DISTRIBUTION. Senegal.

MATERIAL EXAMINED. Left palp of holotype (the rest of the specimen is presumed lost), data given in synonymy.

Myrmarachne ichneumon (Simon)

(Figs 31A–G; 32A–I)

Salticus ichneumon Simon, 1886 : 387, ♂. LECTOTYPE ♂ (here designated), Tanzania (Zanzibar) (MNHN, Paris) [Examined]. Peckham & Peckham, 1892 : 17, pl. 1, figs 7, 7a, 7b.

Myrmarachne ichneumon (Simon): Simon, 1901 : 498. Peckham & Peckham, 1903 : 250. Roewer, 1954 : 943. Bonnet, 1957 : 3007. Roewer, 1965 : 47, figs 38, 38a. Prószyński, 1971b : 438.

Diagnosis. *M. ichneumon* is a fairly distinctive species characterized by its orange colour and elongate body form. It is closely related to *M. elongata* Szombathy and *M. lulengensis* Roewer but can be separated by colour and also the ventral abdominal scutum in larger males. The genitalia are rather similar but the epigyne (Fig. 31D) of *ichneumon* is usually distinct with approximate lateral pouches.

M. ichneumon closely resembles *M. foreli* Lessert in body form and colour but can be readily distinguished by the presence of a distal hook on the tibial apophysis (Fig. 32B–D). *M. foreli* lacks a distal hook and is a member of the *formicaria*-group.

Male. *Carapace* (Fig. 31A, B, G): finely punctured-reticulate; orange with yellowish guanin in eye region and white wedge-shaped band in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with fine white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 32E–G, I): rugulose with furrows; orange with orange-brown lateral keels; fang apophysis present. *Maxillae and Labium*: light orange, labium sometimes darker. *Sternum* (Fig. 32I): orange with darker margins. *Abdomen* (Fig. 31A, B, G): yellowish tinged with grey; dorsal scuta contiguous, orange but sometimes with darker markings; ventral scutum orange, apparently lacking in small specimens; very sparsely clothed with light orange hairs with very scanty white-haired bands in

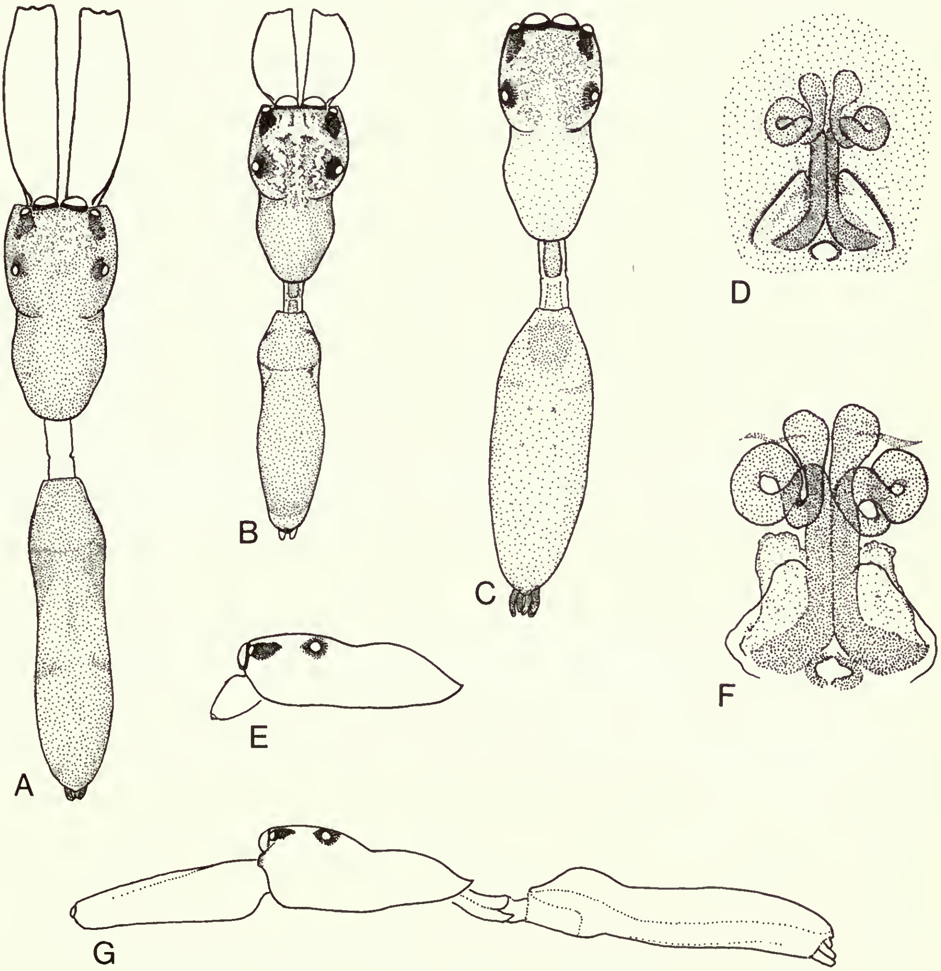

Fig. 31 *Myrmarachne ichneumon* (Simon). Lectotype ♂: (A) dorsal view; (G) lateral view. ♂ from Kenya: (B) dorsal view. ♀ from Kenya: (C) dorsal view; (D) epigyne, ventral view; (E) carapace lateral view; (F) vulva, ventral view.

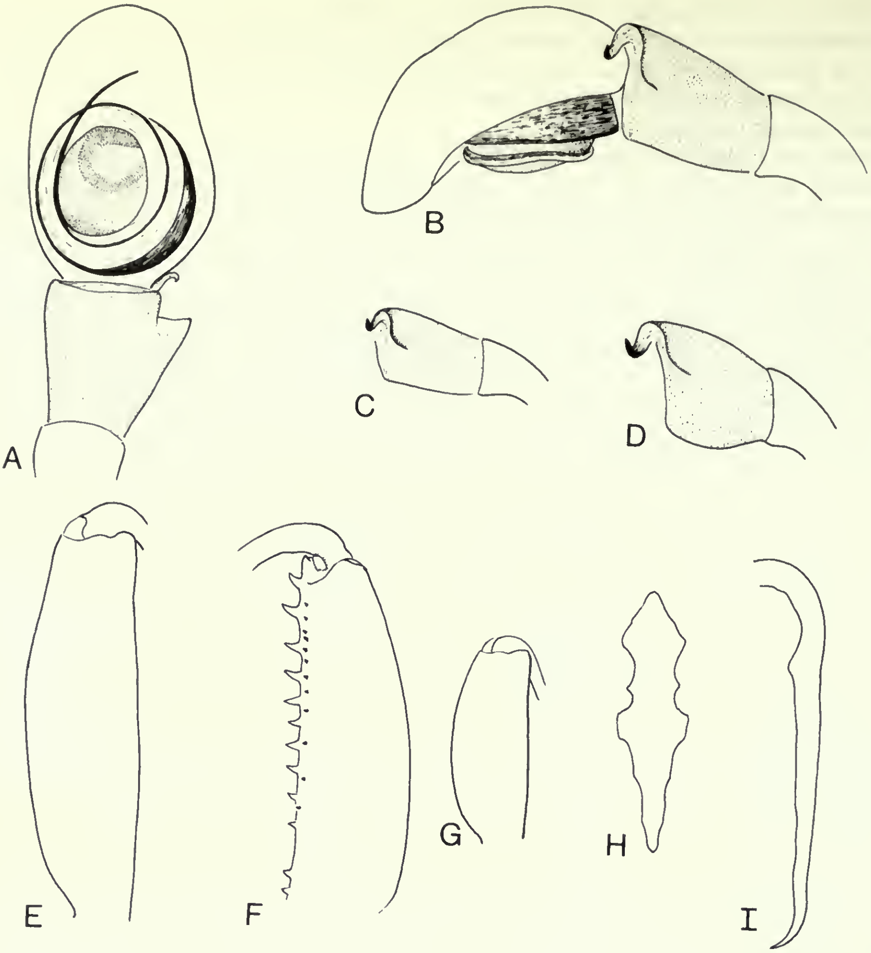

Fig. 32 *Myrmarachne ichneumon* (Simon). Lectotype ♂: (A) palp, ventral view; (B) palp, lateral view; (E) chelicera, dorsal view; (F) chelicera, ventral view; (H) sternum; (I) fang. ♂ from Kenya: (C) palpal tibia. ♂ from Durban: (D) palpal tibia. ♂ from Port Natal: (G) chelicera, dorsal view.

constriction; spinnerets dark orange-brown, sometimes blackish. *Legs*: slender, yellowish orange to orange with tarsi I brown-black and with black streaks on inside of tibiae I and patellae I. Ventral spination of legs I: metatarsi 2–2, tibiae usually 2–2–2, patellae 0. Femora with one or two dorsal or dorsolateral spines, lacking in small specimens. *Palp* (Fig. 32A–D): tibiae variable in shape; tibial apophysis distally hooked; flange moderately well developed; proximal depression fringed with slender setae.

Dimensions: total length 4·8–7·96 mm, carapace length 2·04–2·96 mm. *Ratios*: AM : AL : PM : PL: 10 : 5 : 1 : 5, AL–PM–PL: 6–10; a: 0·80–0·92, b: 0·88–1·0, c: 0·34–0·38, d: 0·52–0·79, e: 0·65–0·68 (7♂ examined).

FEMALE. *Carapace* (Fig. 31C, E): as in ♂. *Eyes*: more or less as in ♂. *Clypeus*: grey haired. *Chelicerae*: rugulose, light orange, shiny; promargin with 7 teeth, retromargin with 8. *Maxillae and Labium*: as in ♂. *Sternum*: yellow-orange. *Abdomen* (Fig. 31C): pale yellowish with a brownish orange patch anteriorly, an obscure brownish band in constriction with an incomplete blackish ring around the spinnerets; sparsely clothed with fine greyish hairs. Legs: more or less as in ♂ but tibiae and patellae I–II with black streaks inside. Ventral spination of legs I as in ♂ but tibiae with 2–1 spines. *Epigyne* (Fig. 31D, F): usually distinct; lateral pouches approximate; spermathecae simple, basic figure eight configuration.

Dimensions: total length 6·52–7·98 mm, carapace length 2·52–2·86 mm. *Ratios*: AM : AL : PM : PL: 8 : 3·5 : 1 : 4, AL–PM–PL: 6–8·5; a: 1·0–1·02, b: 1·0–1·02, c: 0·34–0·35, e: 0·62–0·66 (6♀ examined).

Differences between individual males of this species are analogous with the variation found in male *M. elongata*. A small male from Kenya (accompanied by a female) has the carapace and chelicerae differently shaped (Fig. 31B) and appears to lack the ventral abdominal scutum. The tibiae of the palps are similar but clearly smaller than those of the holotype (Fig. 32C). A Durban specimen, the same size as the holotype, has the palpal tibiae differently shaped (Fig. 32D) with the dorsal and ventral surfaces more curved.

BIOLOGY. Unknown.

DISTRIBUTION. Kenya, South Africa, Tanzania.

MATERIAL EXAMINED. Lectotype ♂, data given in synonymy. KENYA: Kilifi, swept from low bushes and shrubs in a hot, dry sandy garden, 1♂, 1♀, 11.viii.1974 (*J. & F. Murphy*, vial 4049) (BMNH). SOUTH AFRICA: Port Natal, 1♂, 2♀; Durban, 1♂ (*G. P. Staunton*); Durban, 1♂ (*J. F. Quekett*)

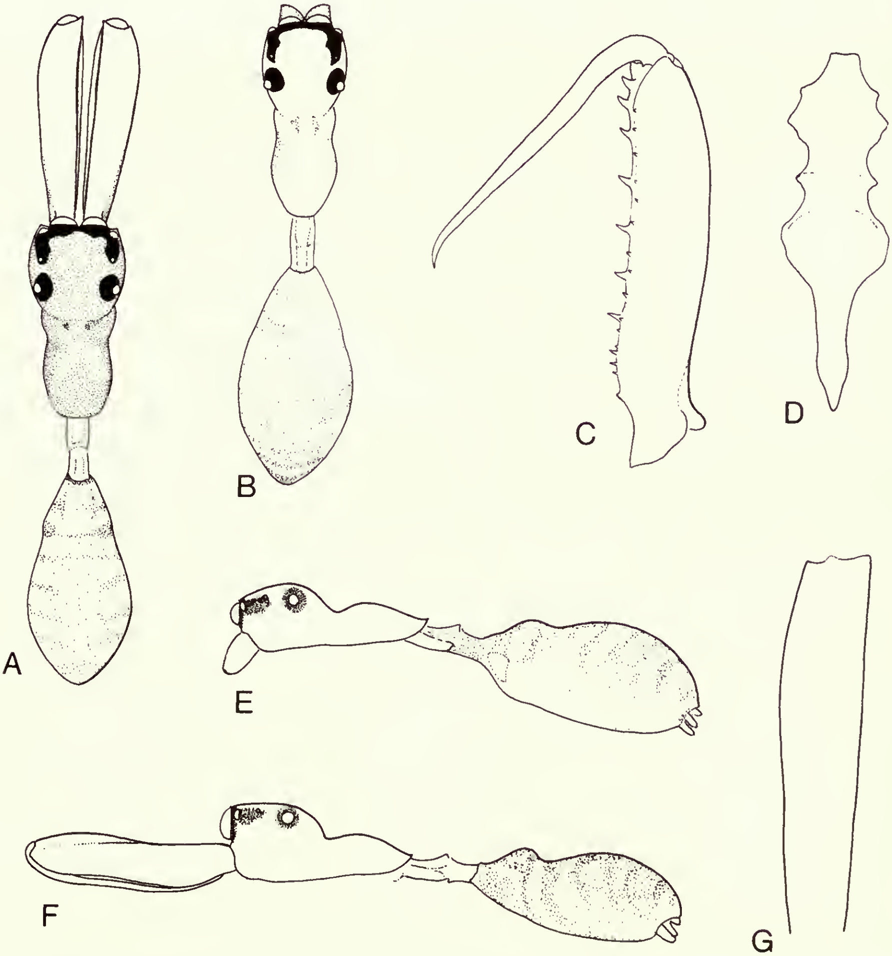

Fig. 33 *Myrmarachne foenisex* Simon. ♂: (A) dorsal view; (C) chelicera, ventral view; (D) sternum; (F) lateral view; (G) chelicera dorsal view. ♀: (B) dorsal view; (E) lateral view.

(BMNH), Umkomaas, 1♀, 30.iv.1965 (*A. L. Capener*, NM 9493); Scottsville, Pietermaritzburg, 1♀, xi.1947 (*R. F. Lawrence*, NM 5255) (NM, Pietermaritzburg). Tanzania: Mts Uluguru, Kiroka forest, 1♂, 27–31.v.1971 (*L. Berger*, *N. Leleup*, *J. Debecker*, MT 141075) (MRAC, Tervuren).

Myrmarachne foenisex Simon

(Figs 33A–G; 34A–E; Pls 1h; 2a; 3e, f)

Myrmarachne foenisex Simon, 1910 : 415, ♂. LECTOTYPE ♂ (here designated), Gabon, Fernand Vaz (MNHN, Paris) [Examined]. Giltay, 1929 : 25, figs 3, 4. Collart, 1929a : 147; 1929b : 117; 1941 : 1. Berland & Millot, 1941 : 406, fig. 96a, b, c. Lessert, 1942 : 10, fig. 5. Roewer, 1954 : 942. Bonnet, 1957 : 3002. Roewer, 1965 : 39, figs 28a, b, c, 43. Prószyński, 1971b : 437.

Diagnosis. *M. foenisex* is a distinctive species readily separated from other members of the *tristis*-group by its characteristic body form and colour (Fig. 33A, B). Its affinities are uncertain but it is fairly close to *M. richardsi* sp. n.

Male. *Carapace* (Fig. 33A–F; Pls 1h; 2a; 3e, f): generally punctured-reticulate; light orange, orange-brown or dark brownish with darker markings in constriction; sparsely clothed with fine, light orange hairs in eye region and posterior part of thorax with white hairs elsewhere, sometimes forming scanty, transverse bands on the thorax. *Eye*: anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: fringed with long whitish hairs. *Chelicerae* (Fig.

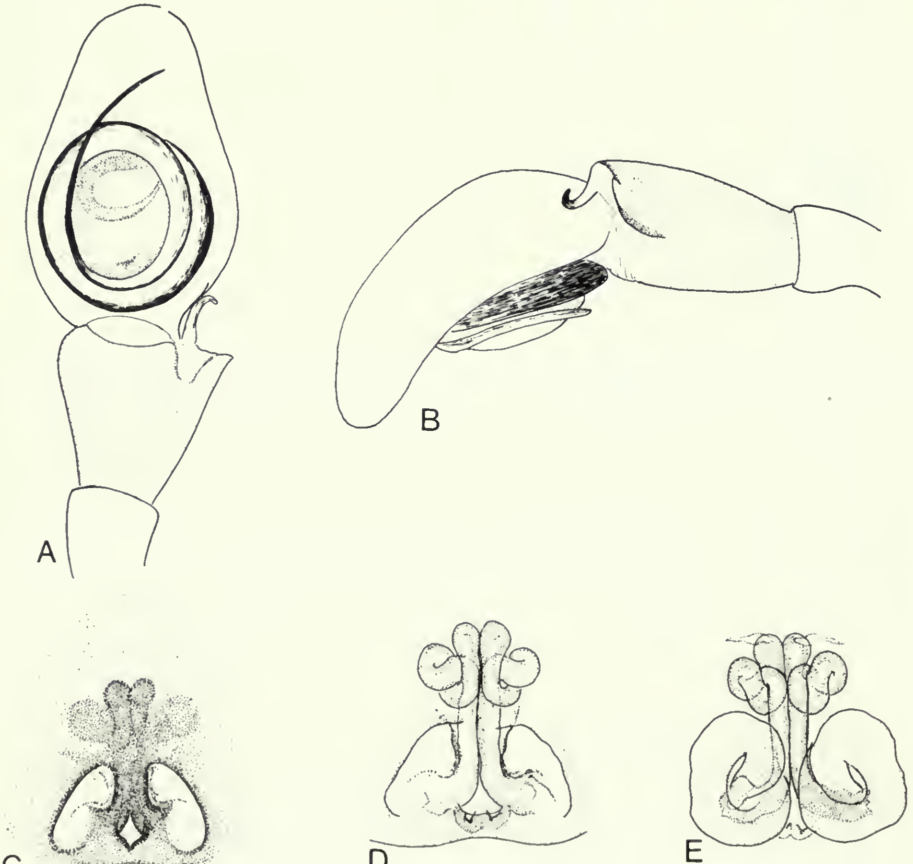

Fig. 34 *Myrmarachne foenisex* Simon. ♂: (A) palp, ventral view; (B) palp, lateral view. ♀: (C) epigyne, ventral view; (D) vulva ventral view; (E) vulva, dorsal view.

33C, G): rugulose, furrows scarcely evident; orange with blackish lateral keels; fang apophysis normally lacking but present in some Angola specimens (Ang. 11238.1, 22090). *Maxillae and Labium*: light orange. *Sternum* (Fig. 33D): light orange with darker margins. *Abdomen* (Fig. 33A, F): yellowish with faint blackish mottling; dorsal scuta orange or orange-brown, sometimes with a series of faint blackish bands; ventral scutum weak, light orange; clothed with fine, light orange-brown hairs. *Legs*: slender, legs I tarsi yellow-brown; metatarsi orange-brown; tibiae and patellae yellow-brown with blackish streaks externally; other segments yellow-brown with blackish sides. Legs II as I but metatarsi, trochanters and coxae yellow-brown. Legs III brownish orange to light orange-brown distally. Legs IV as III but trochanters and coxae light yellowish. Ventral spination of legs I: metatarsi 2–2–2, tibiae usually 2–2–2–2–2, patellae 0. *Palp* (Fig. 34A, B): tibial apophysis distally hooked; flange well developed; proximal depression fringed with stout, black setae.

Dimensions: total length 5·2–7·5 mm, carapace length 2·28–3·24 mm. *Ratios*: AM : AL : PM : PL: 11 : 5 : 1·5 : 6, AL–PM–PL: 8–10; a: 0·94–1·02, b: 1·0–1·02, c: 0·36–0·39; d: 0·47–1·06 e: 1·03–1·05 (10♂ examined).

Female. *Carapace* (Fig. 33B, E): as in ♂. *Eyes*: more or less as in ♂. *Chelicerae*: rugulose; yellowish orange, shiny; promargin with 7 or 8 teeth, retromargin with 10 or 11. *Maxillae and Labium*: as in ♂. *Sternum*: as in ♂. *Abdomen* (Fig. 33B, E): as in ♂ but scuta lacking. *Legs*: more or less as in ♂. Ventral spination as in ♂. *Epigyne* (Fig. 34C–E): sometimes indistinct; lateral pouches apparently contiguous; spermathecae simple, basic figure of eight configuration.

Dimensions: total length 5·68–7·92 mm, carapace length 2·52–3·12 mm. *Ratios*: AM : AL : PM : PL: 10·5 : 5 : 1 : 6, AL–PM–PL: 7–9; a: 1·02–1·04, b: 1·02–1·04, c: 0·35–0·38, e: 0·98–1·01 (7♀ examined).

Biology. Some aspects have been described by Collart (1929a, 1929b, 1941). *M. foenisex* mimics the weaver ant *Oecophylla longinoda* (Latreille) in colour, form and behaviour. It is always found in close proximity to the ant nests which are arboreal and consist of several leaves bound together by silk emitted from the ant larva (Pl. 6a, b). The spider avoids direct contact with the ants, but nevertheless often occurs in the nest. It will feed on small insects and will apparently milk coccids. There is no courtship and at the time of egg laying females are gregarious. They normally lay about 25 eggs in two batches so that eggs and developing embryos may be found in the same nest.

Mr B. Bolton (pers. comm.) has examined the contents of many *longinoda* nests in Western Nigeria and has found *foenisex* actually inside the stitched leaves of cocoa trees (see also Material examined). In some nests the spiders were seen with an ant larva in their jaws. From these observations it would seem reasonable to assume that *foenisex* feeds on ant larvae but as Bolton pointed out it is also possible that the spiders were mimicking ant behaviour as they too take hold of larvae when the nest is disturbed (Pl. 7).

Distribution. Angola, Gabon, Ghana, Guinea, Nigeria, Senegal, Zaire.

Material examined. Lectotype ♂, data given in synonymy. Angola: Dundo, with egg-sac, within dried sheet of *Chaetocarpus africanus*, 1♀, 3.ii.1949 (*A. B. Machado*, Ang. 1317.1); 1♂, 1956 (*A. B. Machado*, Ang. 112381); inside nest of *O. longinoda*, with egg-sac, 1♀, 26.v.1962 (*E. Carvalho*, Ang. 1703.4); 1♂, 6.xi.1969 (*E. Carvalho*, Ang. 22090) (BMNH). Ghana: Legon, from inside *O. longinoda* nests, 27.iv.1976 (*J. Lee*), 2♂, 1♀, 1 immature nest ON 70, 2♀ nest ON 71, 1♀ nest ON 73; Legon, 1♂, xi.1969 (*M. Edmunds*); Legon, 1♀, iii.1969 (*M. Edmunds*); Legon, 3♂, 2♀, xii–i.1973/74 (*M. Edmunds*, vial 39); Mt Atewa, 2♂, 1.viii.1973 (*M. Edmunds*, vial 9); Kade, 1♂, 1♀, 1.ix.1971 (*J. D. Majer*) (BMNH). Guinea: Kindia, 1♀, 1937 (*L. Berland & J. Millot*) (MNHN, Paris). Nigeria: 1♂, 16.xii.1941 (*F. D. Golding*) (BMNH). Senegal: Dakar, 1♂, ix.1937 (*L. Berland & J. Millot*) (MNHN, Paris). Zaire: Tkenge, 1♀, 17.ix.1912 (*R. Mayne*, MT 70869); Makala Ntete, 1♂, 23.iii.1922 (*H. Schouteden*, MT 130758.1) (MRAC, Tervuren).

Myrmarachne richardsi sp. n.

(Fig. 35A–H)

Diagnosis. *M. richardsi* is a fairly distinctive species distinguished from other members of the *tristis*-group by the shape of the carapace (Fig. 35A, G). It is closely related to *M. foenisex* Simon but can be readily separated by its brown-black colour. *M. richardsi* is very similar in body form to *M. vanessae* sp. n. but can be distinguished by its colour and presence of the hooked tibial apophysis (Fig. 35F).

FEMALE. Unknown.

MALE. *Carapace* (Fig. 35A, G): punctured-reticulate; brown-black with lower part of constriction orange-brown; sparsely clothed with whitish hairs in eye region. *Eyes*: anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 35C–E): rugulose with furrows; orange-brown, shiny, with blackish lateral keels; fang apophysis present. *Maxillae and Labium*: brown-black with inner margins of maxillae and labial tip yellow-brown. *Sternum* (Fig. 35H): brownish. *Abdomen* (Fig. 35A, G): mottled brownish black with glossy, brown scuta; very sparsely clothed with light brownish hairs. *Legs*: slender, legs I tarsi yellow-brown; metatarsi brownish black; tibiae, patellae and femora yellow-brown with blackish sides; trochanters and coxae brownish black. Legs II as I but metatarsi yellow-brown. Legs III as II but femora brownish black. Legs IV brownish black but tarsi yellowish,

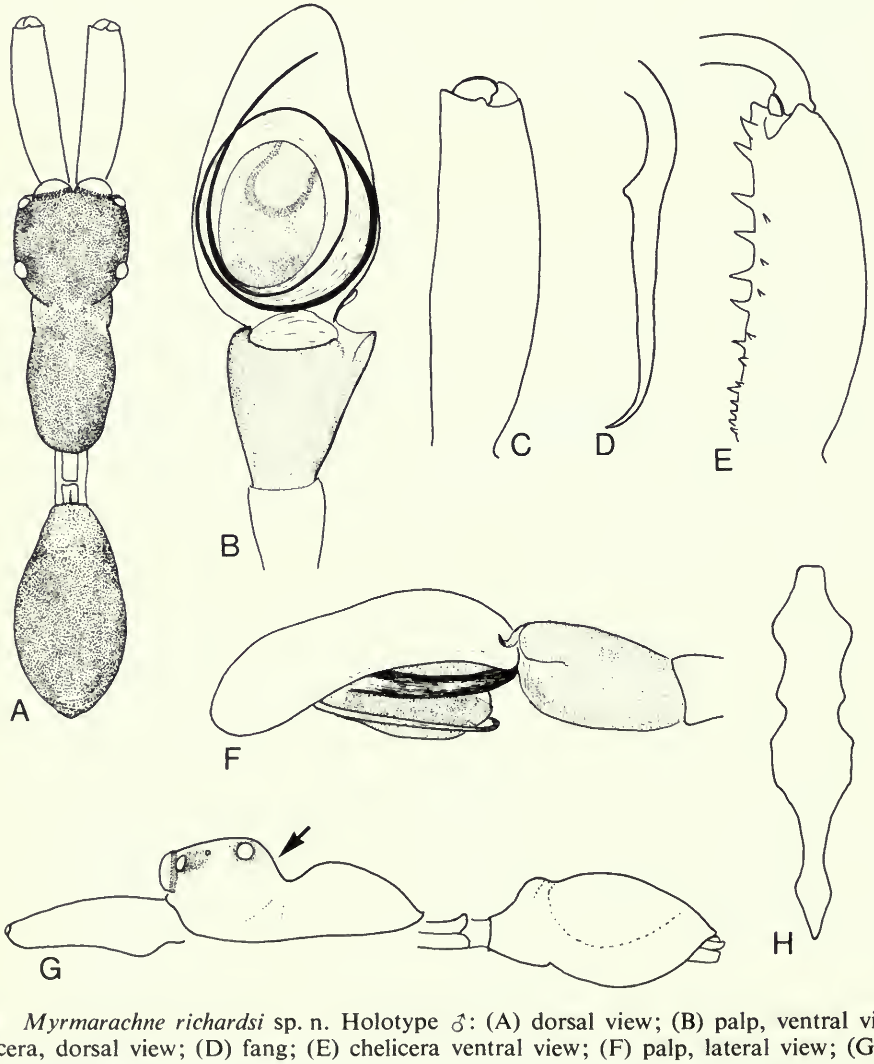

Fig. 35 *Myrmarachne richardsi* sp. n. Holotype ♂: (A) dorsal view; (B) palp, ventral view; (C) chelicera, dorsal view; (D) fang; (E) chelicera ventral view; (F) palp, lateral view; (G) lateral view; (H) sternum.

with yellowish marks on trochanters and patellae. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 0. *Palp* (Fig. 35B, F): tibial apophysis hooked; flange relatively small; proximal depression extends to mid-length, fringed with slender setae.

Dimensions: total length 4·6 mm, carapace length 2·4 mm. *Ratios*: AM : AL : PM : PL: 8·5 : 4·5 : 1 : 4·5, AL–PM–PL: 4·5–6; a: 1·02, b: 1·02, c: 0·33, d: 0·58, e: 0·93 (1♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Ghana.

MATERIAL EXAMINED. Holotype ♂, GHANA: Legon, in wasp cell, No. 81, *Pison* species; 14.iii.69 (*O. W. Richards*) (BMNH, reg. no. 1977.4.21.33).

ETYMOLOGY. The species is named after the wasp specialist and collector Professor O. W. Richards.

Myrmarachne tristis (Simon)

(Figs 36A–H; 37A–E)

Salticus tristis Simon, 1882 : 212, ♀. LECTOTYPE ♀ (here designated), Yemen (MCSN, Genoa) [Examined]. Simon, 1890 : 115. Peckham & Peckham, 1892 : 22, pl. III, figs 2, 2a, 2b.

Salticus tristis var. *rufula* Peckham & Peckham, 1892 : 22, pl. III, figs 2c, 2d, ♂. LECTOTYPE ♂ (here designated), Aden (MCZ, Harvard) [Examined]. Denis, 1966 : 113.

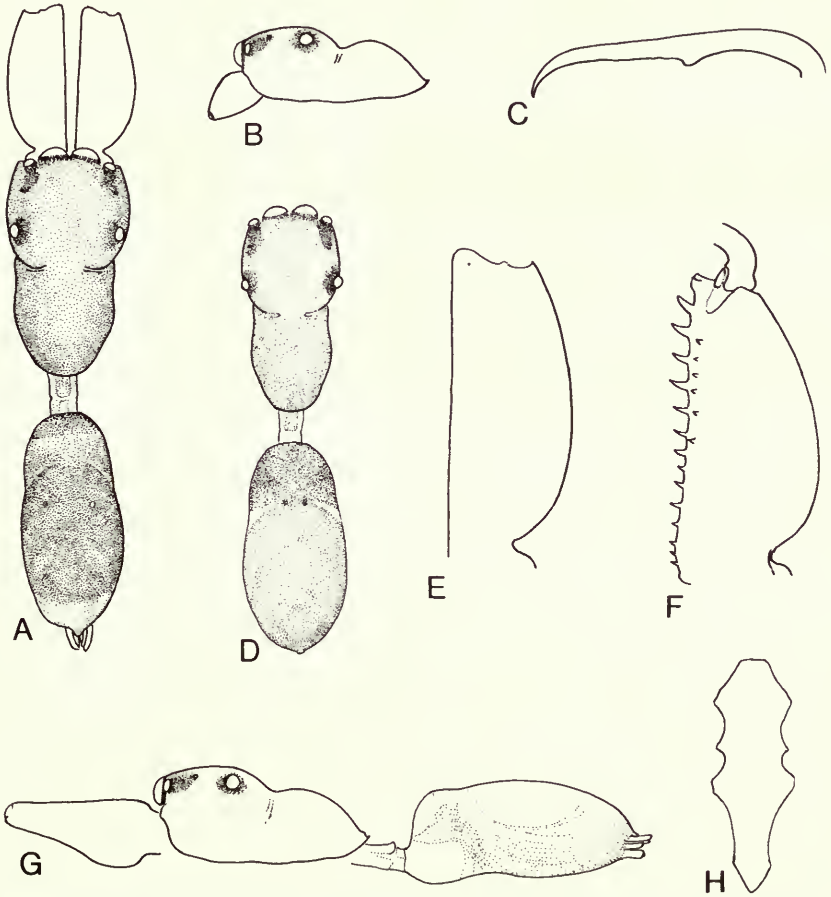

Fig. 36 *Myrmarachne tristis* (Simon). ♂ from Yemen: (A) dorsal view; (C) fang; (E) chelicera, dorsal view; (F) chelicera, ventral view; (G) lateral view; (H) sternum. ♀: (B) carapace, lateral view; (D) dorsal view.

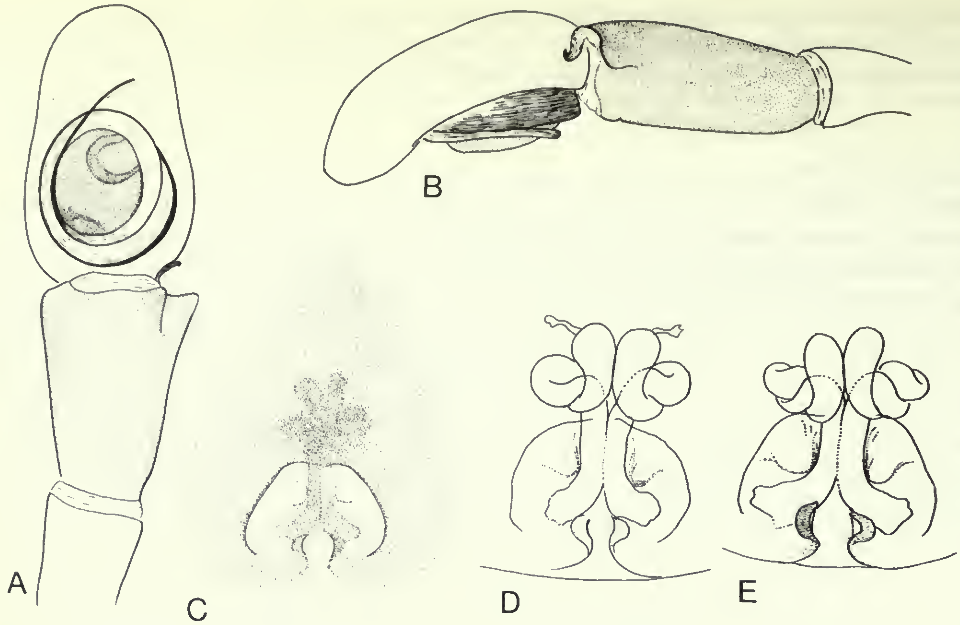

Fig. 37 *Myrmarachne tristis* (Simon). ♂ from Yemen: (A) palp, ventral view; (B) palp, lateral view. ♀ from Yemen: (D) vulva, ventral view; (E) vulva, ventral view of another specimen showing more complex spermathecae.

Myrmarachne tristis (Simon): Simon, 1901 : 501, 503. Narayan, 1915 : 397, pl. XXXII, fig. 3. Caporiacco, 1933 : 333. Roewer, 1954 : 944. Bonnet, 1957 : 3014. Roewer, 1965 : 42, figs 35, 35a. Denis, 1966 : 112, fig. 13. Prószyński, 1971b : 440.

Myrmarachne tristis var. *diversipes* Denis, 1966 : 113, ♂. Libya, environs of lake Tadem'ka (MNHN, Paris) [Not examined, presumed lost].

DIAGNOSIS. *M. tristis* closely resembles *M. marshalli* Peckham & Peckham and *M. legon* sp. n. but may be separated by the presence of only two trichobothria in the mid-dorsal region of the postocular constriction; males may also be distinguished by the well-developed flange (Fig. 37B) and relatively broad chelicerae (Fig. 36A, E), and females sometimes with difficulty by the more or less distinct epigyne (Fig. 37C) and relatively large lateral pouches.

MALE. *Carapace* (Fig. 36A, G): punctured-reticulate; light orange-brown or dark orange-brown with fine, scattered white hairs, and white wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: white haired, *Chelicerae* (Fig. 36C, E, F): rugulose with furrows; orange-brown with blackish lateral keels; fang apophysis present. *Maxillae and Labium*: orange-brown but inner margins of maxillae and labial tip lighter. *Sternum* (Fig. 36H): orange or orange-brown, margins sometimes darker. *Abdomen* (Fig. 36A, G): mottled yellow-brown and black; scuta orange-brown; clothed with yellowish hairs with whitish ones in constriction. *Legs*: slender; legs I orange-brown but tibiae and patellae a shade lighter with blackish streaks inside. Legs II similar to I but with blackish streaks along inside of femora. Legs III orange-brown but tarsi and metatarsi lighter. Legs IV as III but patellae and trocha trochanters marked with yellowish. Ventral spination of legs I: metatarsi 2–2, tibiae rather variable, between 2–2–2 and 2–1, patellae 0. *Palp* (Fig. 37A, B): tibial apophysis distally hooked; flange well developed; proximal depression fringed with slender setae.

Dimensions: total length 4·04–6·44 mm, carapace length 1·92–3·04 mm. *Ratios*: AM : AL : PM : PL: 10 : 5 : 1·2 : 6, AL–PM–PL: 7–10; a: 0·83–0·96, b: 0·91–1·01, c: 0·38–0·42, d: 0·52–0·65, e: 0·74–0·95 (10♂ examined).

FEMALE. *Carapace* (Fig. 36B, D): more or less as in ♂. *Eyes*: as in ♂. *Clypeus*: fringed with light brown hairs. *Chelicerae*: rugulose; orange; promargin with 6–8 teeth, retromargin with 4 or 5. *Maxillae and Labium*: as in ♂. *Sternum*: as in ♂. *Abdomen* (Fig. 36B–D): light orange-brown with blackish mottling; clothed with light yellowish hairs with whitish ones in constriction. *Legs*: slender, legs I tarsi and metatarsi orange-brown; tibiae and patellae yellow-brown with blackish streaks along the sides; femora orange-brown with distal sides yellowish; trochanters and coxae yellowish. Legs II yellow-brown with blackish lateral streaks on tibiae, patellae and femora and on outside of trochanters and coxae. Legs III orange-brown grading to yellow-brown on metatarsi and tarsi. Legs IV orange-brown but trochanters and patellae marked with yellowish. Ventral spination of legs I more or less as in ♂. *Epigyne* (Fig. 37C–E): usually distinct with fairly large lateral lobes that sometimes have distinctly curved lower margins; spermathecae rather variable, configuration simple or relatively complex.

Dimensions: total length 4·8–5·7 mm, carapace 2·0–2·5 mm. *Ratios*: AM : AL : PM : PL: 9 : 5 : 1·2 : 5·5, AL–PM–PL: 7–8·5; a: 1·02, b: 1·02, c: 0·38–0·40, e: 0·68–0·83 (10♀ examined).

BIOLOGY. Unknown but Simon (1890) states that in Yemen, *M. tristis* is extremely common, principally on *Acacia*.

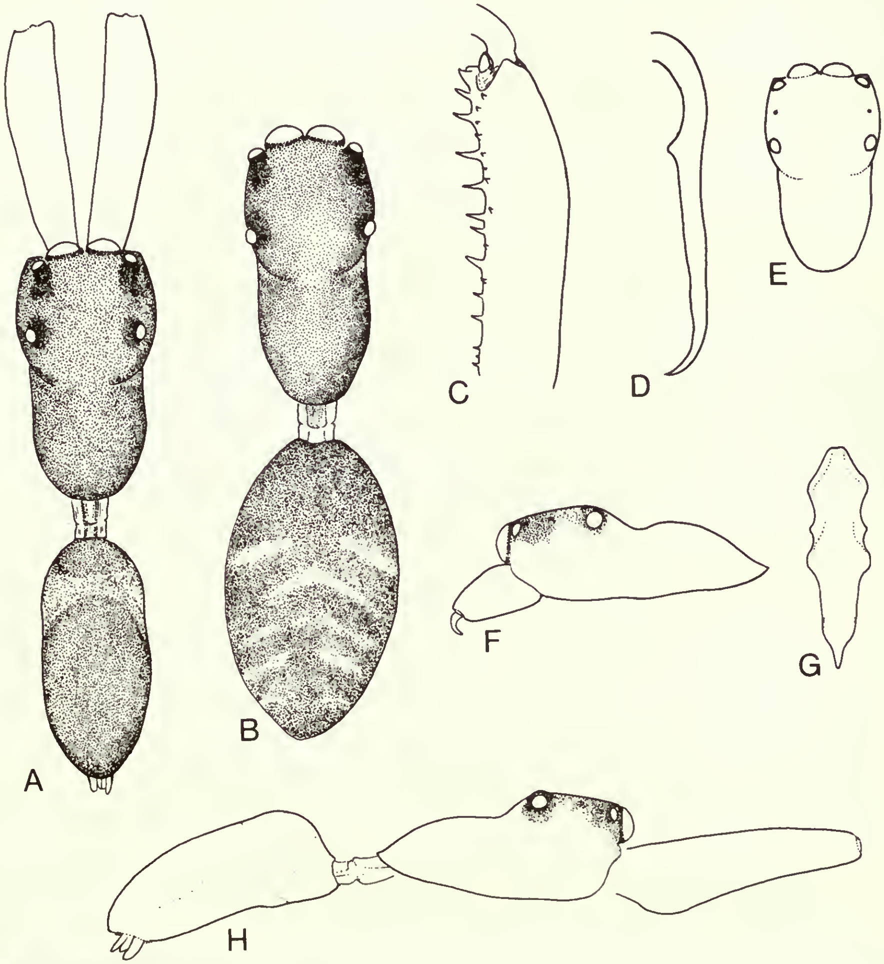

Fig. 38 *Myrmarachne marshalli* Peckham & Peckham. Lectotype ♂: (A) dorsal view; (C) chelicera, ventral view; (D) fang; (H) lateral view. Paralectotype ♀: (B) dorsal view; (F) lateral view; (G) sternum. Lectotype ♂ of *M. akermani* Lawrence: (E) carapace, dorsal view.

DISTRIBUTION. Egypt, Libya, Soudan, Yemen.

MATERIAL EXAMINED. Type data given in synonymy. EGYPT: 1♂, 1901 (*L. A. Jägezskiöld*) (MNHN, Paris). LIBYA: Environs of Lake Tadem'ka, 1♂, 28.iii.1944 (MNHN, Paris). SOUDAN: Khartoum, 1♀, 1962/63 (*J. L. Cloudsley-Thompson*, MT 123050) (MRAC, Tervuren). YEMEN: 13♂, 30♀ (*E. Simon*), 3♂, 12♀ (*E. Simon*) (MNHN, Paris); 1♂, 2♀ (*E. Simon*) (MCZ, Harvard).

REMARKS. The Indian records given by Narayan (1915) are possibly in error as there exists in India, Sri Lanka and Iran a species of *Myrmarachne* very close to *M. tristis* in body form but differing in genital structure.

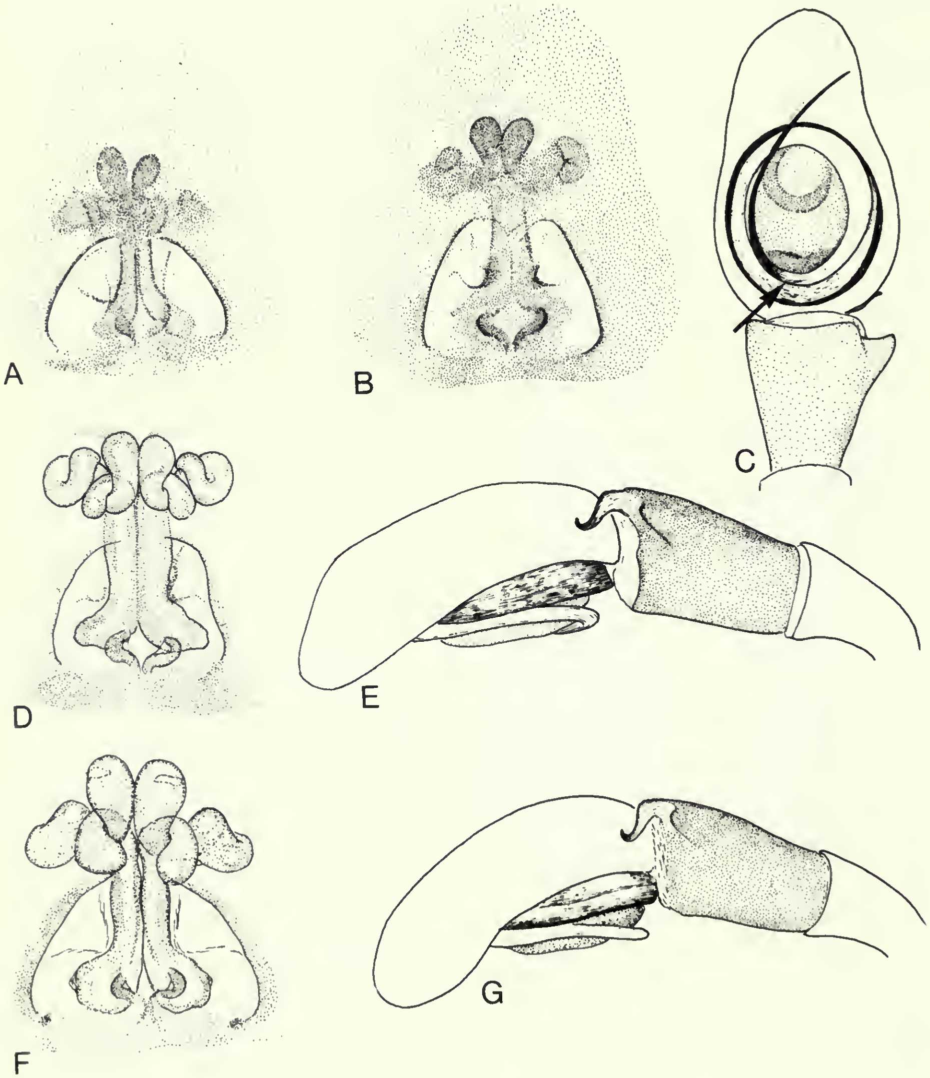

Fig. 39 *Myrmarachne marshalli* Peckham & Peckham. Paralectotype ♀: (A) epigyne, ventral view; (F) vulva, ventral view. Paralectotype ♀ of *M. akermani* Lawrence: (B) epigyne, ventral view; (D) vulva, ventral view. Lectotype ♂: (C) palp, ventral view; (G) palp, lateral view. ♂ holotype of *M. riveti* Berland & Millot, (E) palp, lateral view.

Myrmarachne marshalli Peckham & Peckham

(Figs 38A–H; 39A–G; 40A–K; Pl. 4a, c, e)

Myrmarachne marshalli Peckham & Peckham, 1903 : 249, pl. 24, figs 6, 6a, 6b, ♂, ♀. LECTOTYPE ♂ (here designated), South Africa, Mashonaland (MCZ, Harvard) [Examined]. Lawrence, 1941 : 184. Roewer, 1954 : 943. Bonnet, 1957 : 3009. Roewer, 1965 : 62, fig. 68. Prószyński, 1971b : 439.

Myrmarachne riveti Berland & Millot, 1941 : 410, fig. 99, ♂. Holotype ♂, Guinea, Kinda (MNHN, Paris) [Examined]. Roewer, 1954 : 943; 1965 : 71, fig. 69. **Syn. n.**

Myrmarachne akermani Lawrence, 1941 : 181, figs 28, 29, ♂, ♀. LECTOTYPE ♂ (here designated), South Africa, Winklespruit, Natal (NM, Pietermaritzburg) [Examined]. Roewer, 1954 : 941; 1965 : 68. Prószyński, 1971b : 68. **Syn. n.**

Myrmarachne burgeoni Roewer, 1965 : 54, figs 56, 56a, ♂, ♀. Holotype ♂, Zaire, Ngoma (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 437. **Syn. n.**

Myrmarachne bredoi Roewer, 1965 : 55, fig. 57, ♂. Holotype ♂, Zaire, Kasenyi (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 437. **Syn. n.**

Myrmarachne benoiti Roewer, 1965 : 57, fig. 60, ♂. Holotype ♂, Zaire, Isle Idjwi (Lake Kivu) (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 436. **Syn. n.**

Myrmarachne mulungu Roewer, 1965 : 59, fig. 63, ♂. Holotype ♂, Zaire, Mulungu (MRAC, Tervuren) [Examined]. Prószyński, 1971b : 439. **Syn. n.**

Vial MT 11775 labelled *Myrmarachne burgeoni*, holotype ♂, allotype ♀, contains 2♂ and 1♀. One of the males agrees more or less with the description of Roewer (1965) and is presumed to be the holotype. The other male, and the female, appear to be conspecific with *M. lawrencei* Roewer.

DIAGNOSIS. *M. marshalli* is a very variable species closely related to *M. legon* sp. n. and *M. tristis* (Simon) but may be distinguished by the four trichobothria in the mid-dorsal region of the postocular constriction, and the longitudinal fringe of white hairs on the thorax (Pl. 4a). Rubbed specimens are separated by the relatively narrow chelicerae (Fig. 40A–K), poorly developed flange and relatively large tegulum (Fig. 39C, E, G). Females are separated with difficulty by the structure of the poorly defined epigyne (Fig. 39A, B, D, F).

MALE. *Carapace* (Fig. 38A, E, H; Pl. 4a, c, e): punctured-reticulate with papillae on thoracic part; reddish brown or brown-black with scattered white hairs forming an ill-defined, longitudinal fringe on thoracic part, and white wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved; fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 40A–K): rugulose with furrows; orange or yellow-orange, sometimes reddish, with blackish lateral keels; sparsely clothed with long whitish hairs proximally; tibial apophysis present. *Maxillae and Labium*: orange-brown with inner margins of maxillae and labial tip lighter. *Sternum*: elongate, orange-brown with darker margins. *Abdomen* (Fig. 38A, H): mottled brownish black with dark orange-brown scuta; clothed with whitish hairs. *Legs*: legs I tarsi brown; metatarsi yellow-brown; tibiae and patellae yellow-brown with blackish lateral streaks; femora orange-brown with darker sides; trochanters and coxae yellow-brown. Legs II yellow-brown with blackish lateral streaks on tibiae, patellae and femora. Legs III tarsi, metatarsi and tibiae yellow-brown the latter with darker sides; other segments orange-brown. Legs IV orange-brown but coxae, trochanters and patellae marked with yellowish. Ventral spination of legs I variable, metatarsi 2–2, tibiae usually 2–2–2–2, patellae 0. *Palp* (Fig. 39C, E, G): tibial apophysis distally hooked; flange poorly developed at least in lateral view; proximal depression fringed with stout setae.

Dimensions: total length 4·5–6·7 mm, carapace length 2·12–3·2 mm. *Ratios*: AM : AL : PM : PL: 11 : 5 : 1·5 : 6, AL–PM–PL: 7–8·5; a: 0·88–1·02, b: 0·88–1·0, c: 0·36–0·41, d: 0·64–1·02, e: 0·88–1·10 (10♂ examined).

FEMALE. *Carapace* (Fig. 38B, F): more or less as in ♂. *Eyes*: as in ♂. *Clypeus*: fringed with brownish hairs. *Chelicerae*: rugulose; orange-brown tinged with blackish, shiny; promargin with 6 or 7 teeth, retromargin with 7 or 8. *Maxillae and Labium*: as in ♂. *Sternum*: as in ♂. *Abdomen* (Fig. 38B): mottled yellow-brown and black with a golden sheen and a poorly defined series of chevrons composed of whitish hairs; sometimes a brownish patch anteriorly; in constriction a band of whitish hairs extending and broadening posteriorly to sides of venter. *Legs*: legs I tarsi brownish; other segments yellow-brown to light yellowish with black streaks on both sides excepting coxae. Legs II tarsi, metatarsi and tibiae yellow-brown, the latter with proximal lateral stripes; other segments light yellow-brown but with a black spot on coxae and black streaks inside of femora and on both sides of patellae and trochanters. Legs III tarsi, metatarsi and tibiae yellow-brown the latter with proximal stripes externally; remaining segments dark orange-brown. Legs IV as III but metatarsi orange-brown; patellae marked with yellowish; trochanters and coxae light yellow with blackish sides. Ventral spination of legs I as in ♂. *Epigyne* (Fig. 39A, B, D, F): often poorly defined and rather variable in appearance; lateral pouches approximate; spermathecae relatively complex.

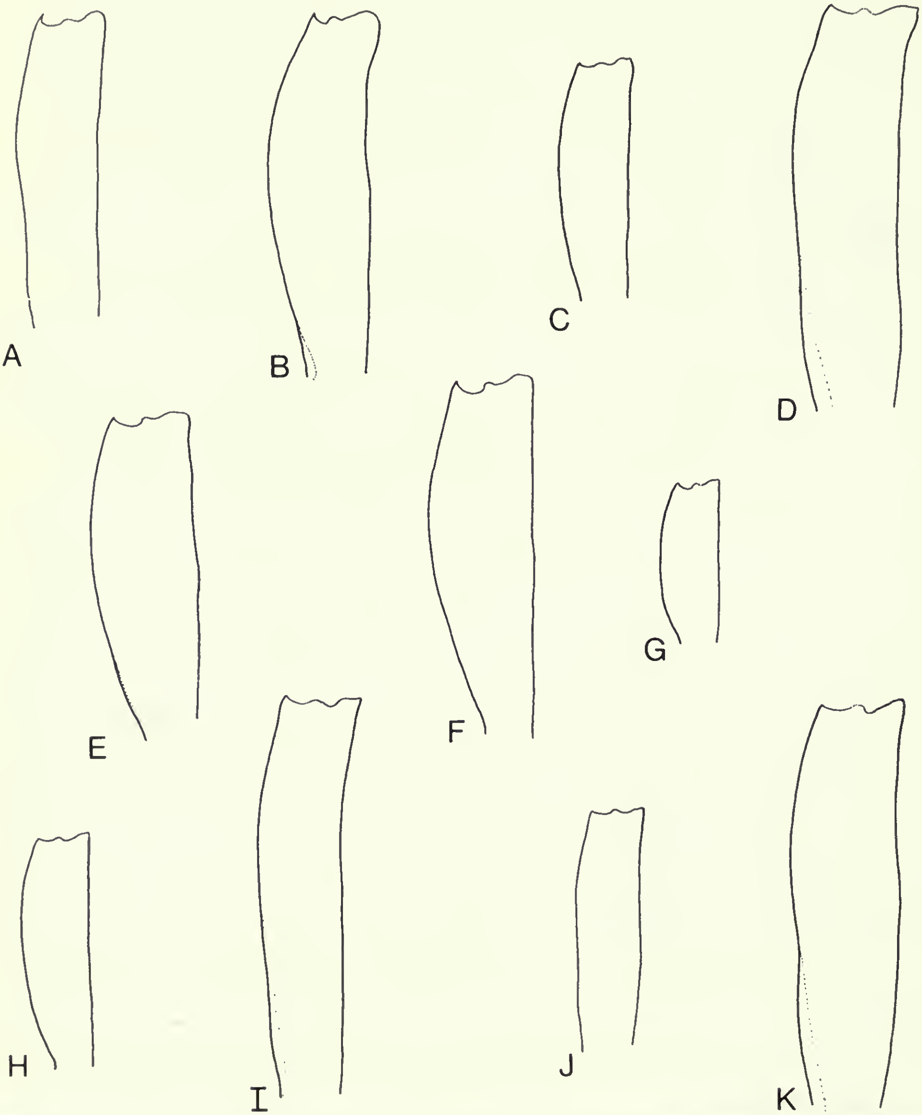

Fig. 40 *Myrmarachne marshalli* Peckham & Peckham. ♂ chelicera showing variation in size and shape (drawn to scale): (A) lectotype of *M. marshalli* Peckham & Peckham; (B) holotype of *M. burgeoni* Roewer; (C) holotype of *M. mulungu* Roewer; (D, F, G, K) males from S. Africa; (E) holotype of *M. riveti* Berland & Millot; (H–J) males from Zaire.

Dimensions: total length 4·44–7·04 mm, carapace length 2·14–3·12 mm; *Ratios*: AM : AL : PM : PL: 9 : 4 : 1 : 5; AL–PM–PL: 6·5–7; a: 1·02–1·04, b: 1·02–1·04, c: 0·36–0·39, e: 0·92–1·01 (8 ♀ examined).

Male chelicerae (Fig. 40A–K) show allometric variation with a trend towards the development of a distal boss in larger specimens. Small males sometimes have the carapace more attenuate posteriorly with ratios a and b close to 1·0 (Fig. 38E). The palps vary slightly in the relative length of the tibiae (Fig. 39E, G) and in the angle subtended by the tibial apophysis also a minute 'tooth' at the point where the pars pendula joins the embolus is not always apparent and may be an artifact (location arrowed in Fig. 39C).

BIOLOGY. *M. marshalli* mimics at least 2 species of *Camponotus* ant and has been found in association with human habitations. It has also been collected from silken cells spun over the midrib of palm scrub in Botswana (A. Russell-Smith and F. Wanless, unpublished observations).

DISTRIBUTION. Angola, Botswana, Guinea, Kenya, Nigeria, South Africa, Tanzania, Zaire.

MATERIAL EXAMINED. Type data given in synonymy. ANGOLA: Lake Calundo, Hiemilignosa, in ant's nest in *Cubitermes* termitarium, 1♂, 19.i.1955 (*Luna de Carvalho*, Ang. 4735.4); Cazombo river, Nhá-Bica, affl. Zambeze, with japanese umbrella, 1♀, 18.ii.1955 (*A. B. Machado*, Ang. 4977.4) (BMNH). BOTSWANA: Boro river, Dandridge House, nr Maun, on walls with *Camponotus* ants, 3♀, 29.ii.1976 (*A. Russell-Smith, F. Wanless*); Manxunyane lagoon, nr Maun: grassland, net sweeping, 1♂, 4.iii.1976, palm scrub, 3♀, 1.iv.1976 (*A. Russell-Smith, F. Wanless*) (BMNH). KENYA: Nairobi, Muthaiga golf course, from tree trunks, 1♂, 1♀, 15.vii.1974 (*J. & F. Murphy*, vial 3538); Kakamega forest, beaten from shrubs at the edge of a path through the rain forest, 1♂, 12.viii.1972 (*J. & F. Murphy*, vial 1898) (BMNH); Takaungu, 2♂ (*B. Percivil*) (BMNH). NIGERIA: Ibadan, 1♂, 28.iii.1973 (*A. Russell-Smith*) (BMNH). SOUTH AFRICA: Natal, Pietermartizburg, with *Camponotus* ants: 1♂, viii.1910 (*C. Akerman*, NM. 1695); 1♀, x.1942 (*C. Akerman*, NM. 3817); 1♂, 2♀, xii.1943 (*R. A. Holliday*, NM. 4218, 4226, 4230); Pietermaritzburg, 1♂, ii.1933 (*O. Harwin*, NM. 1733); 1♂, ix.1942 (*R. A. Holliday*, NM. 3814); 1♀, xi.1961 (*M. Delvin*, NM. 8097); Natal, Winklespruit, 1♂ (*C. Akerman*, NM. 1735); Umhlali, North Coast, Natal, 1♂, 11.1940 (*R. F. Lawrence*, NM. 20138) (NM, Pietermaritzburg); Natal, 1♂ (*C. Martin*) (MNHN, Paris); 2♂, 2♀, Transvaal, Pretoria (MNHN, Paris). TANZANIA: Arusha, on walls, 2♂, 1♀, xiii.1968 (BMNH). ZAIRE: Uvira, in hymenopteran nest, 1♂, 7.ix.1959 (*G. Marlier*, MT 116276); Uvira, in house, 1♂, 2.xii.1954 (*G. Marlier*, MT 85440); Kinshasa, with *Camponotus* ants, 2♂, xi.1972 (*J. van Ryn-Tormel*, MT 146090); Kinshasa, Meyen Congo, Ndjili, 1♂, 5.iii.1968 (*J. van Ryn-Tormel*, MT 135900); Kivu, Plaine de la Rusisi, with *Camponotus* ant, 2♂, 4♀, 17.ii.1967 (*S. Nadani*, MT 133745); Leopoldville, 1♂, 1942 (*A. Lyrersonne*, MT 58100–33) (MRAC, Tervuren).

Myrmarachne legon sp. n.

(Figs 41A–C; 42A–K; Pl. 4b, d, f)

DIAGNOSIS. *Myrmarachne legon* is a very variable species closely related to *M. bamakoi* Berland & Millot, *M. tristis* (Simon) and *M. marshalli* Peckham & Peckham. It is separated from *bamakoi* by the shape of the carapace (Fig. 41A–C) and from *tristis* by the presence of four trichobothria in the mid-dorsal region of the postocular constriction, the finer abdominal pubescence, the poorly developed flange (Fig. 42J), indistinct epigyne and rather small lateral pouches (Fig. 42H, K). From *marshalli* it is separated by the abdominal pubescence and absence of a longitudinal fringe of whitish hairs on the thorax (Pl. 4b); the palp is relatively small and in larger specimens the tegulum is small relative to the cymbium (Fig. 42G); the epigyne is distinguished by its smaller size and simpler spermatheca.

MALE. *Carapace* (Figs 41A–C; 42A, I; Pl. 4b, d, f): punctured-reticulate with papillae on thoracic part; brown-black with very fine scattered white hairs and white wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: grey haired. *Chelicerae* (Fig. 42E, F): rugulose with furrows; orange-brown tinged with black with blackish lateral keels; fang apophysis present. *Maxillae and Labium*: brown-black with inner margins of maxillae and labial tip orange-brown. *Sternum* (Fig. 42D): orange tinged with black. *Abdomen* (Figs 41A–C; 42A, I): mottled brownish black; scuta mahogany brown tinged with black, shiny; very thinly clothed with very fine brownish hairs. *Legs*: legs I tarsi and metatarsi brown-black; tibiae and patellae yellow-brown with black lateral streaks; other segments dark brownish orange. Legs II as I but tarsi and metatarsi yellow-brown. Legs III dark brownish orange with tarsi and metatarsi lighter. Legs IV as III but patellae and trochanters marked with yellowish. Ventral spination of legs I: metatarsi 2–2, tibiae usually 2–2–2–2, patellae 0. *Palp* (Fig. 42G, J): tibial apophysis distally hooked; flange poorly developed, at least in lateral view; proximal depression fringed with stout setae; tegulum relatively small in moderate-sized specimens but less distinctive in dwarfs.

Dimensions: total length 3·16–6·24 mm, carapace length 1·48–2·84 mm. *Ratios*: AM : AL : PM : PL: 9·5 : 4·5 : 1·5 : 5, AL–PM–PL: 6–8, a: 0·84–1·02, b: 0·97–1·02, c: 0·38–0·40, d: 0·45–0·87, e: 0·80–1·0 (10♂ examined).

FEMALE. *Carapace* (Fig. 42C, B): punctured-reticulate; brown-black with very scattered, fine brownish hairs in eye region and fine whitish ones on thoracic part with white wedge-shaped bands in constriction. *Eyes*: more or less as in ♂. *Clypeus*: as in ♂. *Chelicerae*: rugulose; orange to orange-brown, shiny; promargin with 7 or 8 teeth, retromargin with 7–9. *Maxillae and Labium*: as in ♂. *Sternum*: as in ♂. *Abdomen* (Fig. 42C): mottled brownish black with brown patch anteriorly; clothed with fine, brownish hairs with whitish bands in constriction. *Legs*: leg I tarsi and metatarsi brown black; tibia, patellae and femora yellow-brown with black lateral streaks; trochanters and coxae yellow-brown. Legs II yellow-brown with black lateral streaks on tibiae and patellae, and inside femora with a blackish spot on coxae. Legs III dark brown but tarsi and metatarsi yellow-brown. Legs IV as III but tarsi and metatarsi dark brown, patellae and trochanters marked with yellowish. Ventral spination of legs I: as in ♂. *Epigyne* (Fig. 42H, K):

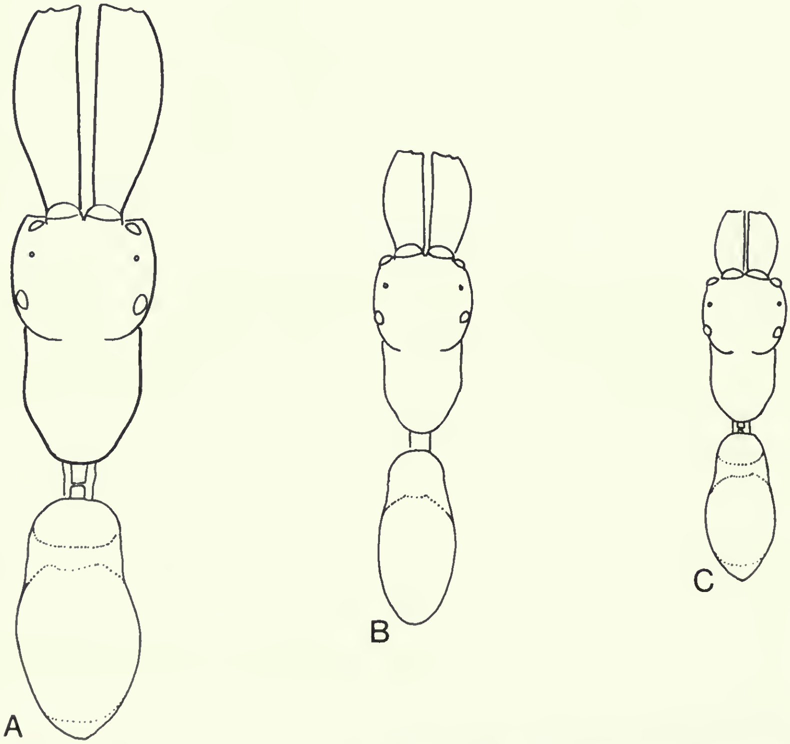

Fig. 41 *Myrmarachne legon* sp. n. Paratype males from Lamto Field Station, Ivory Coast, drawn to scale. (A, B, C) 3 males showing allometric growth from a series of 4 males which were observed in *copula* (M J. L. Ledroux).

small, usually ill-defined; lateral pouches small, spermathecae relatively simple but configuration a little variable.

Dimensions: total length 4·48–6·0 mm, carapace length 2·16–2·6 mm. *Ratios*: AM : AL : PM : PL: 9·5 : 5 : 1 : 5, AL–PM–PL: 6·5–6·5; a: 1·02, b: 1·02–1·04, c: 0·36–0·40, e: 0·83–0·90 (8 ♀ examined).

BIOLOGY. *M. legon* has been found in association with *Crematogaster* ants and with *Camponotus acvapimensis* Mayr in Ghana and is preyed upon by *Pison* wasps (M. Edmunds, pers. comm.). Courtship behaviour has been studied by J. C. Ledroux at Lamto field station in the Ivory Coast (pers. comm.). The male advances softly, tapping the ground with legs I held in front and the consenting female advances a little and flattens herself to the ground. The male passes over her and with the thorax close to the abdomen, he leans to one side and inserts the palp. After insertion the male leans over to the other side and inserts the other palp. When the female is less consenting she faces the male and flees. If she is not receptive she approaches the male with chelicerae and

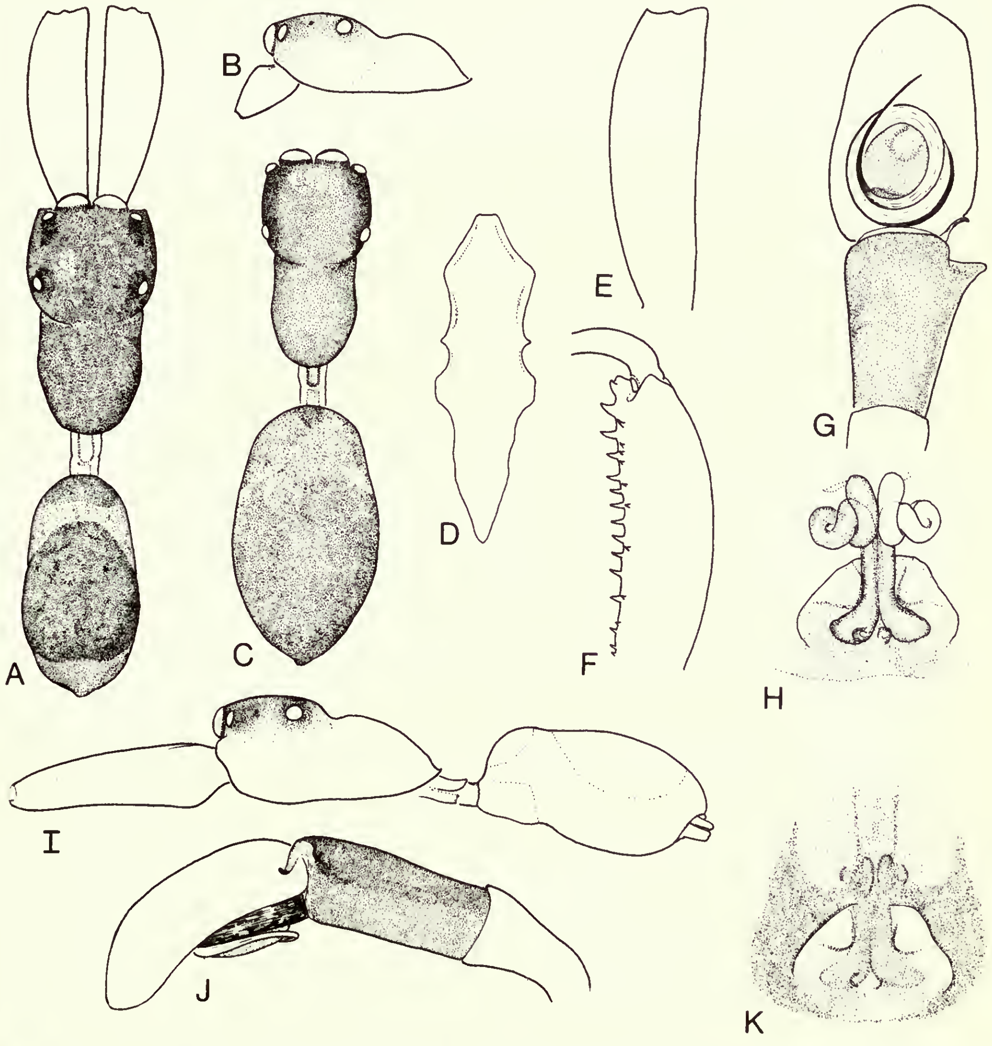

Fig. 42 *Myrmarachne legon* sp. n. Holotype ♂: (A) dorsal view; (D) sternum; (E) chelicera dorsal view; (F) chelicera, ventral view; (G) palp, ventral view; (I) lateral view; (J) palp, lateral view. Paratype ♀: (B) carapace, lateral view; (C) dorsal view; (H) vulva, ventral view; (K) epigyne, ventral view.

fangs spread out and simulates a jump towards the male (advancing and recoiling immediately in the same gesture). The male normally flees but if the female is too aggressive the male in its turn becomes aggressive and simulates attack by opening and closing the chelicerae and fangs; the menacing position lasting for several seconds.

M. legon made no attempt to mate with female *M. foenisex* which were immediately aggressive.

DISTRIBUTION. Ghana, Ivory Coast.

MATERIAL EXAMINED. Holotype ♂, GHANA: Legon, on tree with *Crematogaster* ants, vii.1973 (*M. Edmunds*, vial 31) (BMNH, reg. no. 1975.1.31.40). Paratypes. GHANA: same data as holotype 2♀; Legon, with *Camponotus acvapimensis*, 1♂, 1972 (*M. Edmunds*, vial 26), 4♂, 2♀ (*M. Edmunds*, vial 38), 1♂, 8.iii.1970 (*M. Edmunds*); Legon, from wasp cells, 2♀, 13.i.1971 (*M. Edmunds*, vial 1); Legon, from 5 wasp cells, 4♀, 23 immatures (various instars), 11.ii.1971 (*M. Edmunds*); Accra, on *Calotropis procera*, 1♀, 12.x.1971 (*M. Edmunds*, vial 25) (BMNH). IVORY COAST: Nr Bandama, Lamto Field Station, 4♂, 3♀, between 10 and 18.i.1975 (*J. L. Ledroux*) (MNHN, Paris).

ETYMOLOGY. The specific name is a noun in apposition after the type-locality.

REMARKS. In his studies on courtship behaviour M J. L. Ledroux paired 3 males and 3 females in the following combinations: ♀2 with ♂1 (twice), ♂3 and ♂4; ♀5 with ♂4 and ♂7; ♀6 with ♂4. One of the females (♀6) differs from the rest by having distinctive coarse white hairs on the thorax, but it is in all other respects similar, and there can be little doubt that it is conspecific with *M. legon*. The specimen could be aberrant or even represent a polymorphic form.

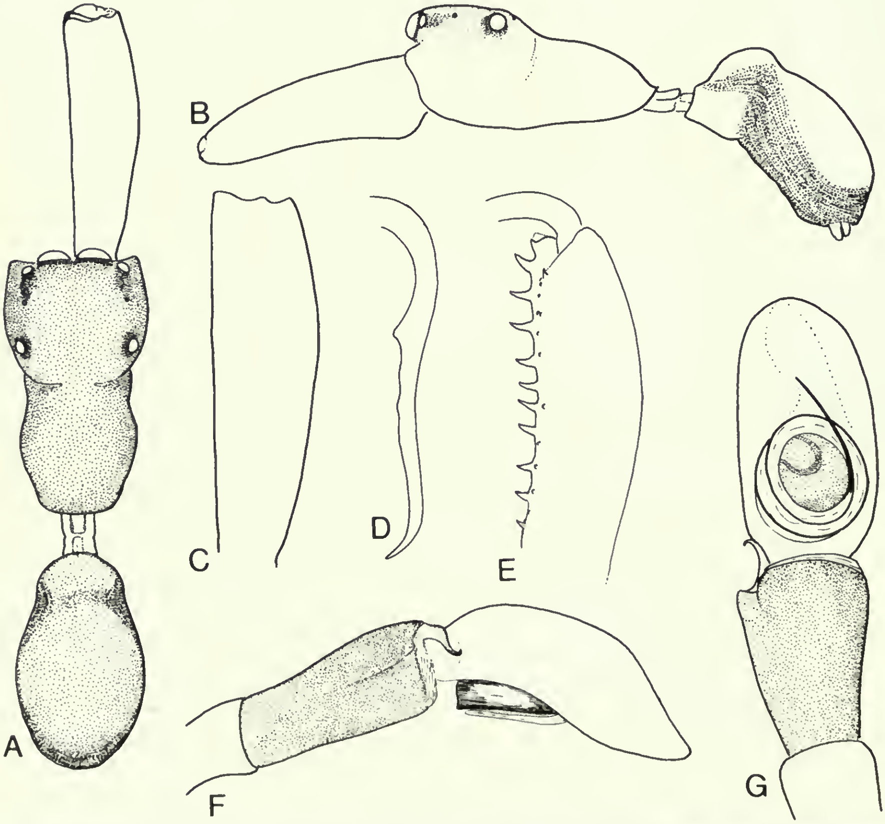

Fig. 43 *Myrmarachne bamakoi* Berland & Millot. Holotype ♂: (A) dorsal view; (B) lateral view; (C) chelicera, dorsal view; (D) fang; (E) chelicera, ventral view; (F) palp, lateral view; (G) palp, ventral view.

Myrmarachne bamakoi Berland & Millot

(Fig. 43A–G)

Myrmarachne bamakoi Berland & Millot, 1941 : 404, fig. 94, ♂. Holotype ♂, Mali, Bamako (MNHN, Paris) [Examined]. Roewer, 1954 : 942; 1965 : 72, fig. 58.

Diagnosis. *Myrmarachne bamakoi* is a distinctive species readily distinguished from other species in the *tristis*-group by the shape of the carapace (Fig. 43A). Its affinities are uncertain but it is probably related to *M. dundoensis* sp. n. a member of the *formicaria*-group.

Female. Unknown.

Male. *Carapace* (Fig. 43A, B): finely punctured-reticulate; orange-brown with scattered light brown hairs and white haired in constriction. *Eyes*: anteriors subcontiguous with apices slightly procurved, fringed with whitish hairs. *Clypeus*: fringed with light brownish hairs. *Chelicerae* (Fig. 43C–E): finely rugulose; yellow-brown; fang apophysis present. *Maxillae and Labium*, yellow-brown tinged with black, but inner distal margin and labial tip lighter. *Sternum*: elongate, narrow; yellow-brown. *Abdomen* (Fig. 43A, B): mottled yellow-brown and black with yellow-brown scuta; sparsely clothed with light orange-brown hairs. *Legs*: slender; light brown tinged with black but tarsi and metatarsi II whitish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 0. *Palp* (Fig. 43F, G): tibial apophysis relatively long and slender with distal hook; flange poorly developed; proximal ectal margin of cymbium depressed, fringed with moderately stout setae.

Dimensions: total length 5·7 mm, carapace length 2·9 mm. *Ratios*: AM : AL : PM : PL: 10·5 : 5 : 1·3 : 5·5, AL–PM–PL: 8–9·5; a: 0·82, b: 0·96, c: 0·37, d: 0·96, e: 1·03 (1♂ examined).

Biology. Unknown.

Distribution. Mali.

Material examined. Holotype ♂, data given in synonymy.

The *formicaria*-group

This group takes its name from a European species *M. formicaria* (DeGeer) and may be distinguished by the following characters. Males: tibial apophysis more or less sinuous (Fig. 47C); flange poorly developed or lacking in most Ethiopian species but well developed in *M. formicaria* and in some individuals of *M. dundoensis* sp. n. (Pl. 5); proximal ectal margin of cymbium not depressed or protuberant; seminal reservoir medium to small, not marginate (Figs 59C; 57L). Females: median subtriangular pouch present; spermathecae looped or twisted (Fig. 46J); proximal seminal ducts poorly defined.

One Madagascan and 12 African species belong to this group which is also known to occur in the Palaeartic and Oriental regions.

Myrmarachne cowanii (Peckham & Peckham)

(Figs 44A–E; 45A–G)

[*Salticus augustus* Peckham & Peckham, 1892 (in part) ♂ variety with long falces, p. 24, pl. 1, figs 5a, 5b, 5c, Madagascar (MCZ, Harvard). Misidentification.] [Examined.]

Iola cowanii Peckham & Peckham, 1892 : 75, pl. 6, figs 3, 3a, 3b, 3c, ♀. LECTOTYPE ♀ (here designated), Madagascar (MCZ, Harvard) [Examined]. Roewer, 1954 : 942.

Myrmarachne cowani: Bonnet, 1957 : 3001. Roewer, 1965 : 65. Prószyński, 1971b : 437.

The specimen regarded here as the male of this species was originally described by Peckham & Peckham as a variety of *Salticus augustus* Peckham & Peckham.

Diagnosis. *M. cowanii* is a fairly distinctive species separated from other species in the *formicaria*-group by its elongate body (Figs 44A, E; 45A, G), proximally arched fang (Fig. 45C) and the form of the spermathecae (Fig. 44D). It is also the only species of this group known to occur in Madagascar.

FEMALE. *Carapace* (Fig. 44A, E): dark brownish orange with white, wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, sparsely fringed with whitish hairs. *Chelicerae*: missing but originally described as 'rather long and stout, vertical, parallel'. *Sternum* (Fig. 44B): orange-brown. *Abdomen* (Fig. 44A, E): mottled brownish black with a pair of white spots on either side of constriction. *Legs*: missing but I and II originally described as light brown with legs III and IV dark brown. *Epigyne* (Fig. 44C, D): very pale and small; the convolutions of the spermathecae are not altogether characteristic of this group.

Dimensions: total length 5·1 mm, carapace length 1·88 mm. *Ratios*: AM : AL : PM : PL: 7·5 : 3·5 : 1 : 3, AL–PM–PL: 5–6; a: 1·0, b: 1·0, c: 0·38 (1♀ examined).

MALE. *Carapace* (Fig. 45A, C): punctured-reticulate in eye region; dark reddish orange with white, wedge-shaped bands in constriction. *Eyes*: as in ♀. *Clypeus*: white haired. *Chelicerae* (Fig. 45B–D): finely rugulose; orange; fang strongly arched proximally; apophysis present. *Sternum*: similar to ♂; orange with poorly defined margins. *Abdomen* (Fig. 45A, G): mottled brownish orange and black; scuta ill-defined, dark reddish tinged with black; a pair of white spots in constriction (originally a band). *Legs*: mostly detached but those which remain are generally orange-brown with femora III and IV darker. *Palp* (Fig. 45E, F).

Dimensions: total length 4·9 mm, carapace length 1·96 mm. *Ratios*: AM : AL : PM : PL: 8 : 4 : 1 : 4, AL–PM–PL: 5–6·5; a: 0·96, b: 0·98, c: 0·38, d: 1·28 (1♂ examined).

In the female the carapace and abdomen were originally described as black with a white band around the abdominal constriction. The epigyne has probably faded and may look quite different in fresh specimens.

BIOLOGY. Unknown.

DISTRIBUTION. Madagascar.

MATERIAL EXAMINED. Lectotype ♂, data given in synonymy. MADAGASCAR: 1♂ (MCZ, Harvard).

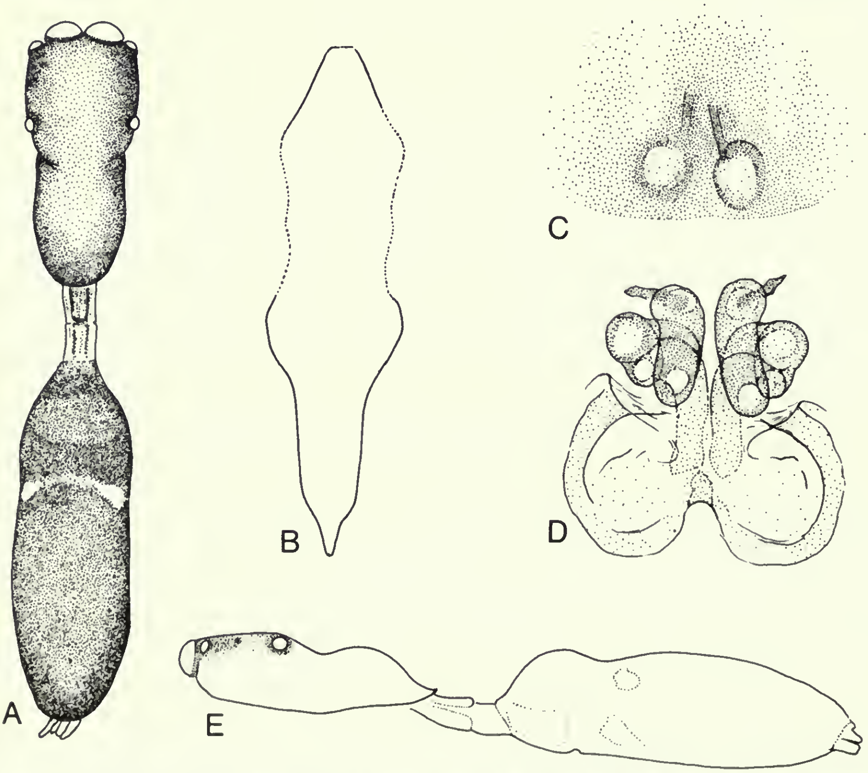

Fig. 44 *Myrmarachne cowanii* (Peckham & Peckham). Lectotype ♀: (A) dorsal view; (B) sternum; (C) epigyne, ventral view; (D) vulva, ventral view; (E) lateral view.

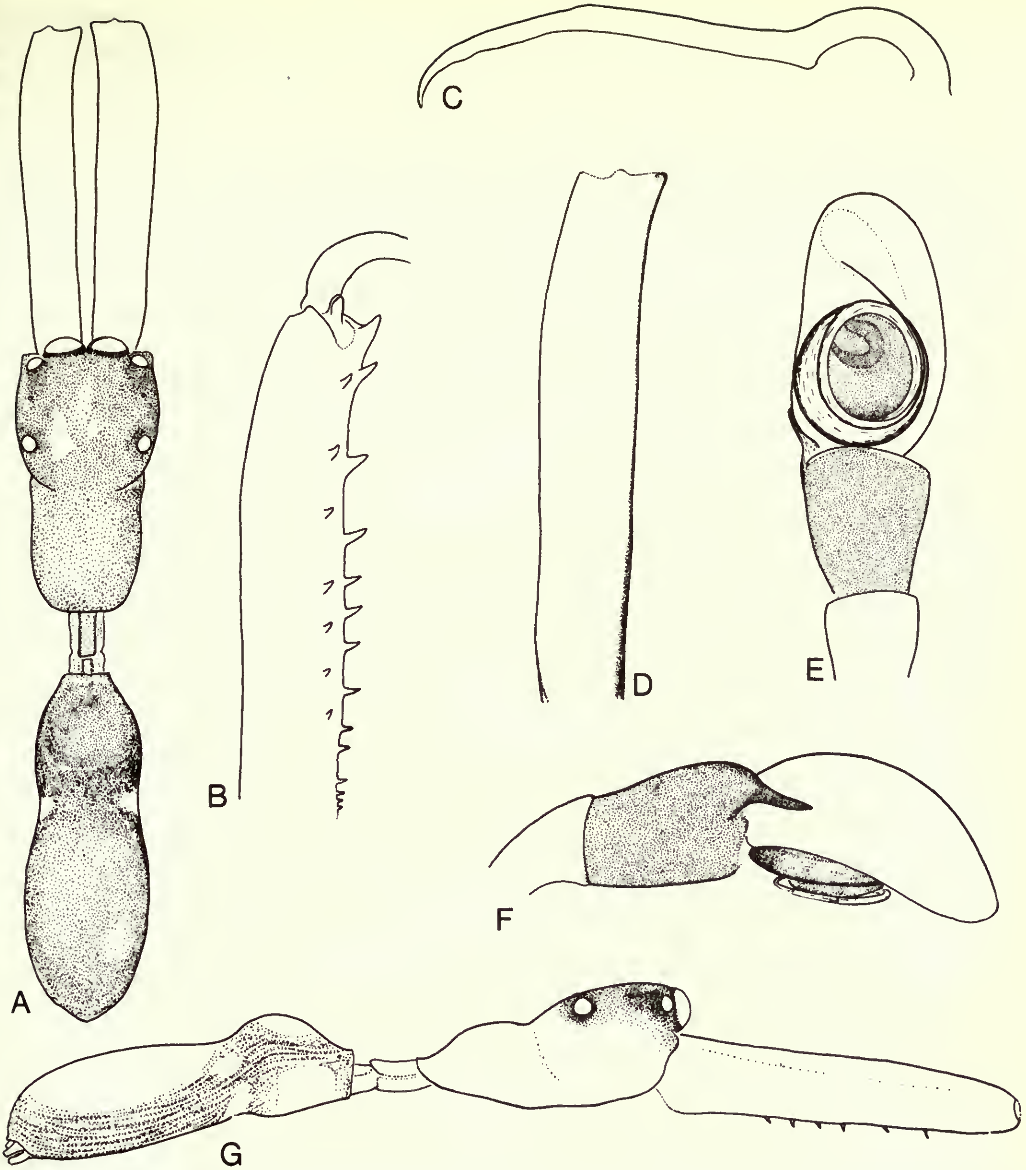

Fig. 45 *Myrmarachne cowanii* (Peckham & Peckham). ♂: (A) dorsal view; (B) chelicera, ventral view; (C) fang; (D) chelicera, dorsal view; (E) palp, ventral view; (F) palp, lateral view; (G) lateral view.

Myrmarachne solitaria Peckham & Peckham

(Fig. 46A–L)

Myrmarachne solitarius Peckham & Peckham, 1903 : 250, pl. 29, figs 5, 5a, ♂♀. LECTOTYPE ♂ (here designated), South Africa, Devil's Mountain, Cape Colony (MCZ, Harvard) [Examined].

Myrmarachne solitaria: Roewer, 1954 : 944. Bonnet, 1957 : 3013. Roewer, 1965 : 71. Prószyński, 1971b : 440.

DIAGNOSIS. *Myrmarachne solitaria* is closely related to *M. kiboschensis* Lessert, *M. leleupi* sp. n. and *M. uelensis* sp. n., but may be distinguished by the lack of fang apophyses (Fig. 46E) and looped spermathecae (Fig. 46J).

MALE. *Carapace* (Fig. 46A, H): punctured reticulate; orange-brown with white wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with fine white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 46E, F, K): more or less horizontal but dorsal surface with a marked inward slope; rugulose with furrows; orange-brown; fang apophysis lacking. *Abdomen* (Fig. 46A, H): mottled brownish black with shiny orange-brown scuta and scattered white hairs in constriction. *Legs*: femora I slightly enlarged. Legs I with tarsi, patellae, trochanters and coxae yellow-brown; other segments light brown. Legs II yellow-brown but femora pale brown. Legs III–IV light brown with oblique yellow-brown markings on patellae IV. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–1–2, patellae 1. *Palp* (Fig. 46B, L): the tegulum has a very slight distal cleft.

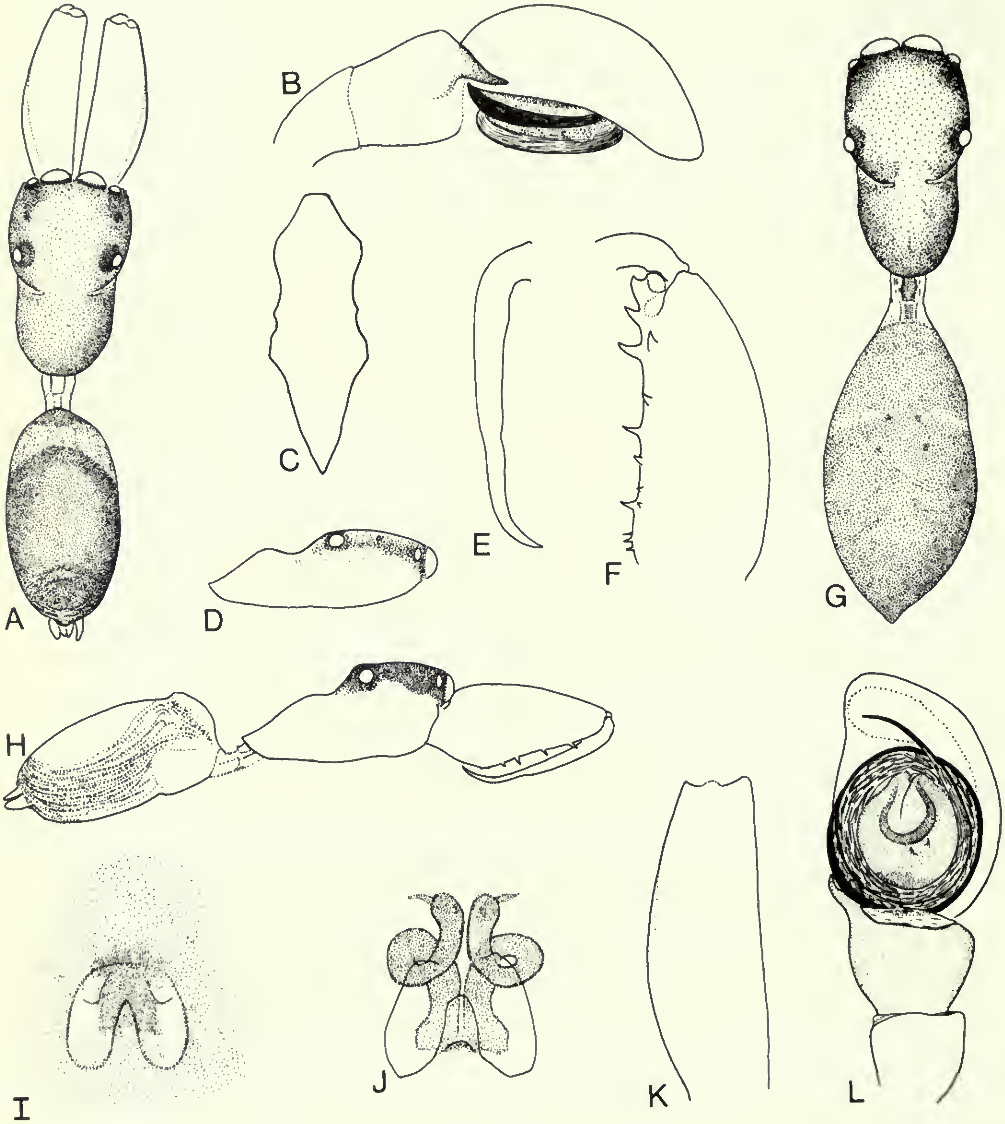

Fig. 46 *Myrmarachne solitaria* Peckham & Peckham. Lectotype ♂: (A) dorsal view; (B) palp, lateral view; (C) sternum; (E) fang; (F) chelicera, ventral view; (H) lateral view; (K) chelicera dorsal view; (L) palp, ventral view. Paralectotype ♀: (D) carapace, lateral view; (G) dorsal view; (I) epigyne, ventral view; (J) vulva, ventral view.

Dimensions: total length 4·0 mm, carapace length 1·86 mm. *Ratios*: AM : AL : PM : PL: 7 : 4 : 1 : 4·2, AL–PM–PL: 6–6; a: 0·93, b: 0·98, c: 0·41, d: 0·75, e: 0·88 (1♂ examined).

FEMALE. *Carapace* (Fig. 46D, G): orange-brown but dorsal margins of constriction darker. *Eyes*: more or less as in ♂. *Clypeus*: as in ♂. *Chelicerae*: rugulose; light orange, shiny; promargin with 6 teeth, retromargin with 5 or 6. *Sternum*: yellow brown. *Abdomen* (Fig. 46G): greyish brown with whitish hairs in area of constriction. *Legs*: legs I yellow-brown with blackish sides excepting tarsi and coxae. Legs II light yellowish with black streaks on sides of tibiae and patellae and inside of femora. Legs III tarsi and metatarsi yellow-brown; tibiae yellow-brown with black sides; patellae black-brown dorsally, yellowish ventrally; other segments brownish black. Legs IV tarsi and metatarsi distally yellow-brown; metatarsi proximally and femora brown-black; patellae brown-black marked with yellowish; coxae and trochanters light yellowish with darker apices. Ventral spination of legs I as in ♂ but tibiae with 2–2–2 spines. *Epigyne* (Fig. 46I, J): small and pale, the spermathecae simply looped.

Dimensions: total length 4·40 mm, carapace length 1·72 mm. *Ratios*: AM : AL : PM : PL: 8 : 4 : 1 : 4, AL–PM–PL: 6–6; a: 1·02, b: 1·02, c: 0·43, e: 0·72 (1♀ examined).

BIOLOGY. Unknown.

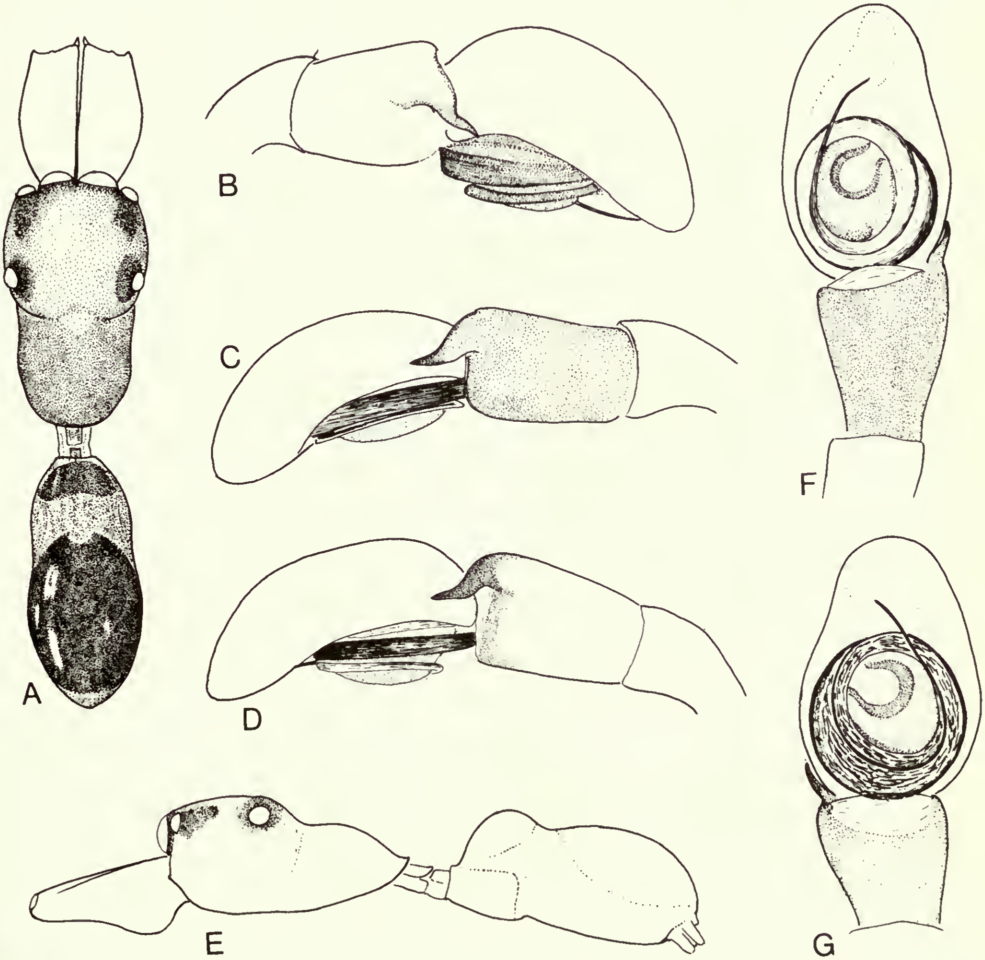

Fig. 47 *Myrmarachne kiboschensis* Lessert. Lectotype ♂: (B) palp, lateral view; (G) palp, ventral view. ♂ from Botswana: (A) dorsal view; (C) palp, lateral view; (F) palp, ventral view; (E) lateral view. ♂ from Sudan, (D) palp, lateral view.

DISTRIBUTION. South Africa.

MATERIAL EXAMINED. Lectotype ♂, data given in synonymy. Paralectotype: SOUTH AFRICA: Retreat Flats, Cape Colony, 1 ♀ (MCZ, Harvard).

Myrmarachne kiboschensis Lessert
(Fig. 47A–G; 48A–K)

Myrmarachne kiboschensis Lessert, 1925a : 441, figs 18–22, ♂♀. LECTOTYPE ♂ (here designated), Tanzania, Kiboscho (NR, Stockholm) [Examined]. Roewer, 1954 : 943. Bonnet, 1957 : 3007. Roewer, 1965 : 43, fig. 50. Prószyński, 1971b : 438.

Myrmarachne diversicoxis Caporiacco, 1947 : 227, pl. 2, fig. 62, ♀. Holotype ♀, Tanzania, Moshi (TM, Budapest) [Examined]. Roewer, 1954 : 942; 1965 : 44. **Syn. n.**

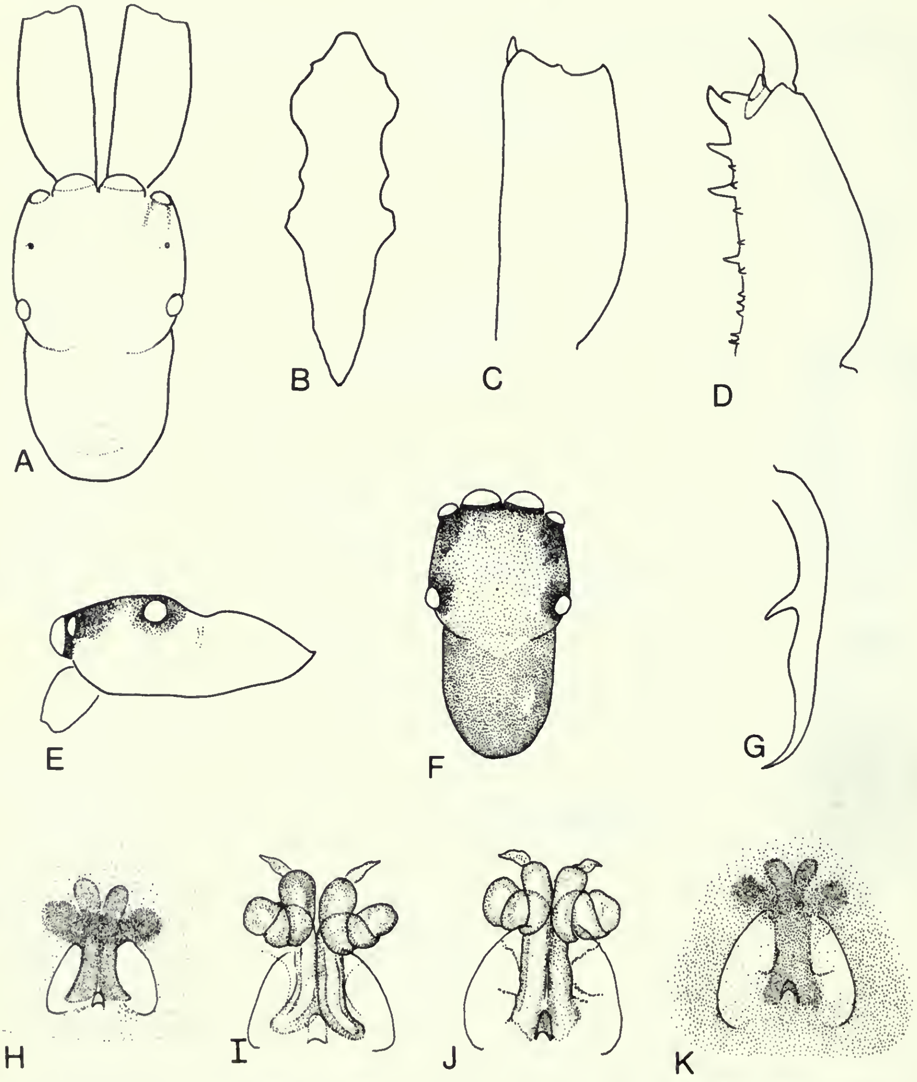

Fig. 48 *Myrmarachne kiboschensis* Lessert. ♂ from Sudan: (A) carapace, dorsal view. ♂ from Botswana: (B) sternum; (C) chelicera, dorsal view; (D) chelicera, ventral view; (G) fang. Paralectotype ♀: (E) carapace, lateral view; (F) carapace, dorsal view; (H) epigyne, ventral view; (I) vulva, ventral view. Holotype, female of *M. diversicoxis* Caporiacco: (J) vulva, ventral view; (K) epigyne, ventral view.

DIAGNOSIS. *M. kiboschensis* is closely related to *M. solitaria* Peckham & Peckham, *M. leleupi* sp. n. and *M. uelensis* sp. n. Males are separated by the combination of palpal structure (Fig. 47B–D, F, G), stout, fang apophysis (Fig. 48G) and lack of abdominal pubescence. Females are distinguished by the small median pouch and simple but somewhat tightly twisted spermathecae (Fig. 48H–K).

MALE. *Carapace* (Figs 47A, E; 48A): punctured-reticulate; orange-brown or reddish brown tinged with black; very sparsely clothed with fine blackish hairs but white wedge-shaped bands apparently lacking. *Eyes*: anteriors subcontiguous with apices weakly procurved, sparsely fringed with white hairs. *Clypeus*: sparsely fringed with long, fine hairs. *Chelicerae* (Fig. 48C, D, G): rugulose with furrows; orange-brown mottled with blackish, shiny; fang apophysis present, well developed. *Maxillae and Labium*: orange-brown tinged with black. *Sternum* (Fig. 48B): light orange-brown tinged with black, margins darker. *Abdomen* (Fig. 47A): blackish with glossy black scuta and oblique yellowish bands on the sides. *Legs*: legs I with tarsi whitish yellow; metatarsi blackish; tibiae and patellae orange-brown with black lateral streaks; femora black; trochanters and coxae yellow-brown, the latter with black sides. Legs II as I but metatarsi and femora yellow-brown with blackish lateral streaks. Legs III tarsi yellowish; metatarsi and tibiae yellow-brown with black sides; patellae and femora blackish; trochanters and coxae blackish but venter mottled black and yellow-brown. Legs IV as III but metatarsi and tibiae black; patellae black, marked with yellowish; trochanters and coxae yellow with black sides. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 1. *Palp* (Fig. 47B–D, F, G).

Dimensions: total length 3·48–5·56 mm, carapace length 1·64–2·56 mm. *Ratios*: AM : AL : PM : PL: 10 : 6 : 1·4 : 6, AL–PM–PL: 8·5–8; a: 0·94–1·02, b: 0·95–1·02, c: 0·40–0·46, d: 0·44–0·59, e: 0·84–0·92 (10♂ examined).

FEMALE. *Carapace* (Fig. 48E, F): as in ♂. *Eyes*: more or less as in ♂. *Clypeus*: as in ♂. *Chelicerae*: rugulose with weak, proximal, prolateral keels; orange, shiny; promargin with 4 teeth, retromargin with 8. *Maxillae and Labium*: as in ♂. *Sternum*: as in ♂. *Abdomen*: black with a golden sheen with oblique yellowish bands on the sides and faint dorsal chevrons. *Legs*: as in ♂ but venter of femora I distally light yellow. *Epigyne* (Fig. 48H–K): spermathecae closely looped.

Dimensions: total length 3·72–6·24 mm, carapace length 1·72–2·44 mm. *Ratios*: AM : AL : PM : PL: 10 : 5 : 1·2 : 5·5, AL–PM–PL: 8–7; a: 1·02–1·03, b: 1·04–1·06, c: 0·42–0·45, e: 0·81–0·95 (9♀ examined).

Colour of preserved specimens shows considerable variation and ranges from light yellow to blackish and some individuals have a distinct reddish tinge especially on the carapace. In paler specimens the anterior scutum often loses its black gloss, and while the posterior scutum may be somewhat reduced anteriorly, it retains its glossy black colour except in older preserved specimens or newly moulted individuals. A male from Sudan has the carapace differently shaped with transverse grooves on the thorax (Fig. 48A), also the tibial apophysis is slightly more sinuous.

BIOLOGY. *M. kiboschensis* has been collected from the same square metre plot of *Setaria* grassland as *M. foreli* Lessert, *M. dundoensis* sp. n., and *M. uvira* sp. n. It has also been taken with *Campanotus* ants of the *vetitus*-group and with the ant *Odontomachus troglodytes* Santschi.

In courtship the ♂ approaches the ♀ with a side-stepping movement but with the front legs bunched up, the tibiae and patellae being parallel and almost touching the chelicerae. In *copula* the ♂ lies above the ♀ but facing in the opposite direction, both tilting to one side when the palp is inserted (F. Wanless, unpublished observations).

DISTRIBUTION. Botswana, Kenya, Sudan, Tanzania.

MATERIAL EXAMINED. Type data given in synonymy. BOTSWANA: Island Safari Lodge, nr Maun, 1♀, 21.ix.1975 (*A. Russell-Smith*); Mboma Island, flood plain grassland, 1♀, 16.x.1975 (*A. Russell-Smith*), 1♂, 14.iii.1976 (*A. Russell-Smith & F. Wanless*); Mushu, Mushu Bridge, flood plain grassland, 1♀, 10.iii.1976 (*A. Russell-Smith & F. Wanless*); Maun, dried out lagoon, nr Maphaneng Pan, 1♀, 27.ii.1976 (*A. Russell-Smith*); Maun, Thamalakane River, grassland, 8♀, 16♂, 14.i–23.iii.1976 (*A. Russell-Smith & F. Wanless*) (BMNH). KENYA: Naro Moru, swept from bushes and vegetation by the side of the river, 1♀, 17.viii.1974 (*J. & F. Murphy*) (BMNH). SUDAN:

between Malakal and Shambe, 1♂, 8.xii.1961 (*J. Cloudsley-Thompson*, MT 120808.1) (MRAC, Tervuren).

Myrmarachne leleupi sp. n.

(Figs 49A, B, E; 50B, D, E, G, I)

DIAGNOSIS. *M. leleupi* is closely related to *M. solitaria* Peckham & Peckham, *M. kiboschensis* Lessert and *M. uelensis* sp. n., but may be distinguished by the combination of shallow tegular cleft (Fig. 49B), abdominal pubescence, fang apophysis (Fig. 50B) and slight, distal, cheliceral constriction (Fig. 50I).

FEMALE. Unknown.

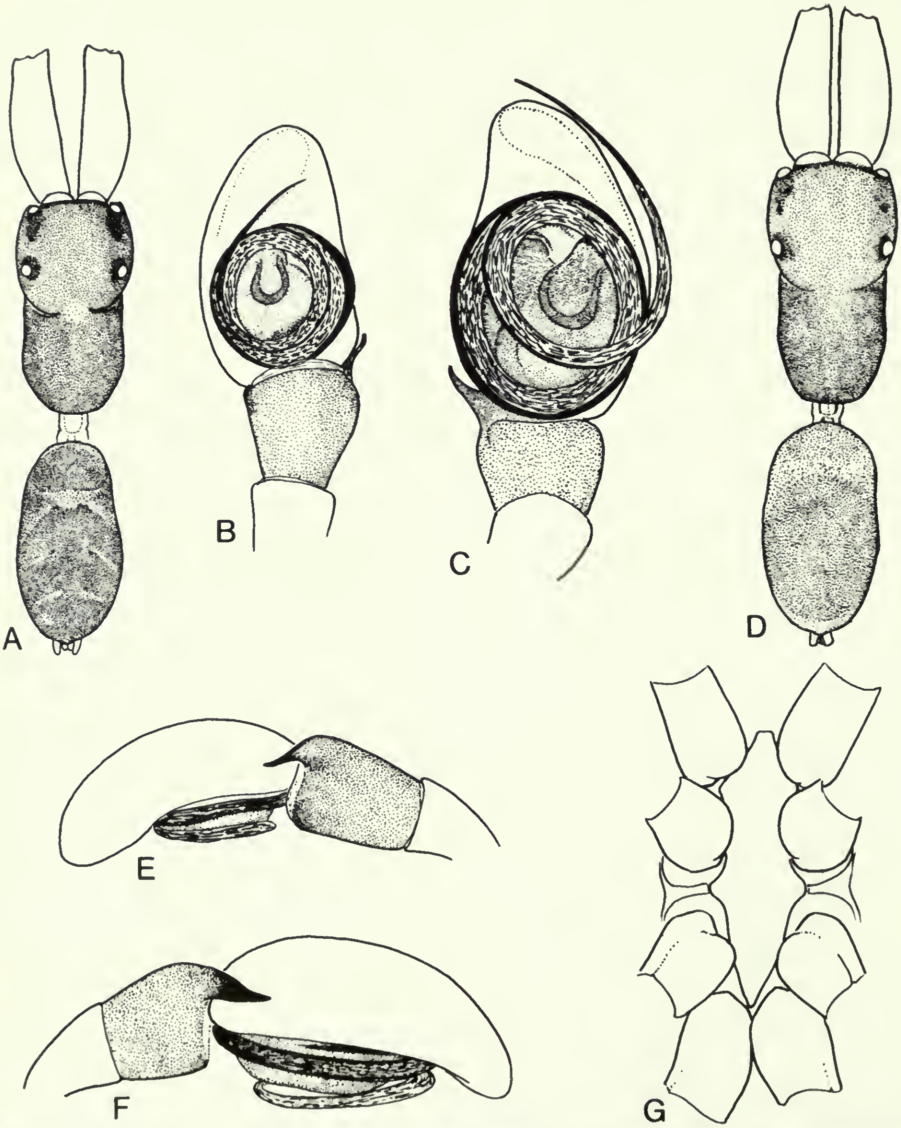

Fig. 49 (A, B, E) *Myrmarachne leleupi* sp. n. Holotype ♂: (A) dorsal view; (B) palp, ventral view; (E) palp, lateral view. (C, D, F, G) *Myrmarachne uelensis* sp. n. Holotype ♂: (C) palp, ventral view; (D) dorsal view; (F) palp, lateral view; (G) sternum.

MALE. *Carapace* (Fig. 49A; 50D): punctured-reticulate; dark brown with scattered white hairs. *Eyes*: anteriors subcontiguous with apices procurved, fringed with fine white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 50B, G, I): rugulose with furrows; orange-brown with blackish lateral keels; fang apophysis present. *Maxillae and Labium*: orange-brown tinged with blackish. *Sternum* (Fig. 50E): orange-brown tinged with black. *Abdomen* (Fig. 49A; 50E): mottled blackish brown; scuta poorly defined, orange-brown tinged with blackish, a golden sheen posteriorly; clothed with whitish hairs forming rather vague transverse bands. *Legs*: legs I generally yellow-brown with blackish sides but femora brown-black, and coxae yellowish. Legs II yellow-brown but with blackish sides on femora, trochanters and coxae. Legs III tarsi yellow-brown; metatarsi yellow-brown with blackish sides proximally; tibiae and patellae blackish but ventral and inner sides yellow-brown; other segments blackish brown. Legs IV tarsi black becoming yellow-brown distally; metatarsi, tibiae and femora brown-black; patellae brown-black but venter yellowish; trochanters and coxae light yellow with blackish sides. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 1. *Palp* (Fig. 49B, E).

Dimensions: total length 5·6 mm, carapace length 2·72 mm. *Ratios*: AM : AL : PM : PL: 10·5 : 5·5 : 1 : 6·5, AL–PM–PL: 7·5–7; a: 0·94, b: 0·97, c: 0·45, d: 0·73, e: 0·92 (1♂ examined).

BIOLOGY. Unknown.

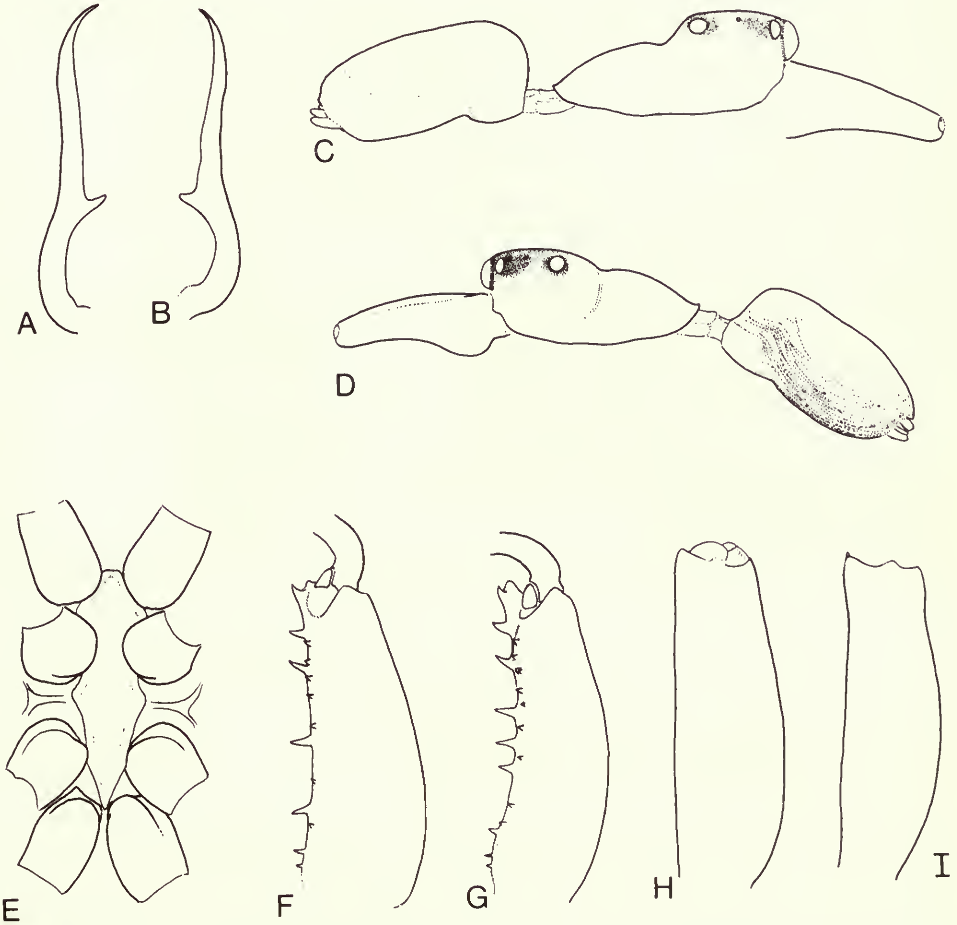

Fig. 50 (B, D, E, G, I) *Myrmarachne leleupi* sp. n. Holotype ♂: (B) fang; (D) lateral view; (E) sternum; (G) chelicera, ventral view; (I) chelicera, dorsal view. (A, C, F, H) *Myrmarachne uelensis* sp. n. Holotype ♂: (A) fang; (C) lateral view; (F) chelicera ventral view; (H) chelicera, dorsal view.

DISTRIBUTION. South Africa.

MATERIAL EXAMINED. Holotype ♂, South Africa, Natal, Pietermaritzburg, x.1960 (*N. Leleup*, MT 132196) (MRAC, Tervuren).

ETYMOLOGY. This species is named in honour of the collector M N. Leleup whose African work has considerably enriched the collections of the Musée Royal de l'Afrique Central.

Myrmarachne uelensis sp. n.

(Figs 49C, D, F, G; 50A, C, F, H)

DIAGNOSIS. *M. uelensis* is closely related to *M. leleupi* sp. n. from South Africa. It differs by having 3 or 4 pairs of ventral spines on metatarsi I; the tibial apophysis of the palp is heavier and the cleft in the anterior margin of the tegulum is deeper (Fig. 49C). These characters and the presence of abdominal pubescence also separates *M. uelensis* from *M. kiboschensis* Lessert.

FEMALE. Unknown.

MALE. *Carapace* (Figs 49D; 50C): punctured-reticulate; dark brown with scattered white hairs and white wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved. *Clypeus*: fringed with long white hairs. *Chelicerae* (Fig. 50A, F, H): rugulose with furrows; orange-brown, shiny; fang apophysis present. *Maxillae and Labium*: brownish black. *Sternum* (Fig. 49G): brown-black. *Abdomen* (Figs 49D; 50C): yellow-brown with orange-brown scuta; clothed with whitish pubescent hair. *Legs*: legs I with tarsi and metatarsi brownish; tibiae and patellae light brown with blackish sides; femora black with distal, venter light brown; trochanters and coxae dark brown. Legs II tarsi and metatarsi yellow-brown; tibiae and patellae yellow-brown with blackish sides; other segments blackish. Legs III blackish with tarsi and distal metatarsi yellow-brown. Legs IV as III but trochanters and venter of coxae yellow-brown. Ventral spination of legs I: metatarsi 2–2–2 and 2–2–2–2, tibiae 2–2–2–2–2, patellae 1. *Palp* (Fig. 49C, F): robust with relatively deep cleft in anterior margin of tegulum.

Dimensions: total length 4·3 mm, carapace length 2·2 mm. *Ratios*: AM : AL : PM : PL: 9 : 4·5 : 1 : 4·5, AL–PM–PL: 7–6, a: 1·0, b: 1·0, c: 0·39, d: 0·70, e: 1·09 (1♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Zaire.

MATERIAL EXAMINED. Holotype ♂, ZAIRE, Moto, Upper Uele, xi.1922 (*L. Burgeon*, MT 130761) (MRAC, Tervuren).

ETYMOLOGY. The specific name refers to the type-locality.

Myrmarachne dundoensis sp. n.

(Figs 51A–I; 52A–E; Pl. 5a, b)

DIAGNOSIS. *M. dundoensis* is a distinctive member of the *formicaria*-group. Males are readily distinguished by the low value of ratio a, the relatively long thorax (Fig. 51A) and double fang apophysis (Fig. 51F). Females are separated by the form of the carapace (Fig. 52A, C), the darkening of tarsi I and epigyne structure (Fig. 52B, D, E). The affinities of *dundoensis* are uncertain but it could be confused with *M. bamakoi* Berland & Millot, a fairly distinctive member of the *tristis*-group.

MALE. *Carapace* (Fig. 51A, B): punctured-reticulate; brownish orange mottled with black; eye region darker with a metallic sheen; sparsely covered with whitish hairs and with white wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: fringed with long fine brownish hairs. *Chelicerae* (Fig. 51E, F, I): rugulose with furrows; brownish orange with black lateral keels; fang with 2 apophyses *Maxillae and Labium*: brownish orange. *Sternum* (Fig. 51H): brownish orange with blackish stippling. *Abdomen* (Fig. 51A, B): mottled brownish black with dark brown scuta; sparsely covered with whitish hairs. *Legs*: legs I tarsi and metatarsi orange suffused with black; tibiae and patellae orange-brown with black lateral streaks; remaining segments orange-brown suffused with black but distal sides of femora light yellowish. Legs II tarsi and metatarsi orange-brown suffused with black; tibiae and patellae yellow-brown with black streaks; other segments yellow-brown suffused with black. Legs III tarsi yellow-brown; other segments blackish. Legs IV blackish with white trochanters and yellowish marks on patellae. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 1. *Palp* (Fig. 51C, D, G; Pl. 5a, b): the tibial apophysis is more sinuous in some individuals and the flange varies in its development.

Dimensions: total length 5·12–6·88 mm, carapace length 2·44–3·15 mm. *Ratios*: AM : AL : PM : PL: 10 : 4 : 1·7 : 4·5, AL–PM–PL: 7–8; a: 0·73–0·89, b: 0·89–0·98, c: 0·34–0·36, d: 0·59–0·73, e: 1·0–1·08 (10♂ examined).

FEMALE. *Carapace* (Fig. 52A, C): more or less as in ♂. *Eyes*: as in ♂. *Clypeus*: as in ♂. *Chelicerae*: rugulose; orange-brown, shiny; promargin with 7 teeth, retromargin with 6–8. *Maxillae and Labium*: as in ♂. *Sternum*: blackish stippled with orange-brown. *Abdomen*: greyish black clothed with fine whitish hairs and with two rather obscure, transverse bands composed of dull, yellowish

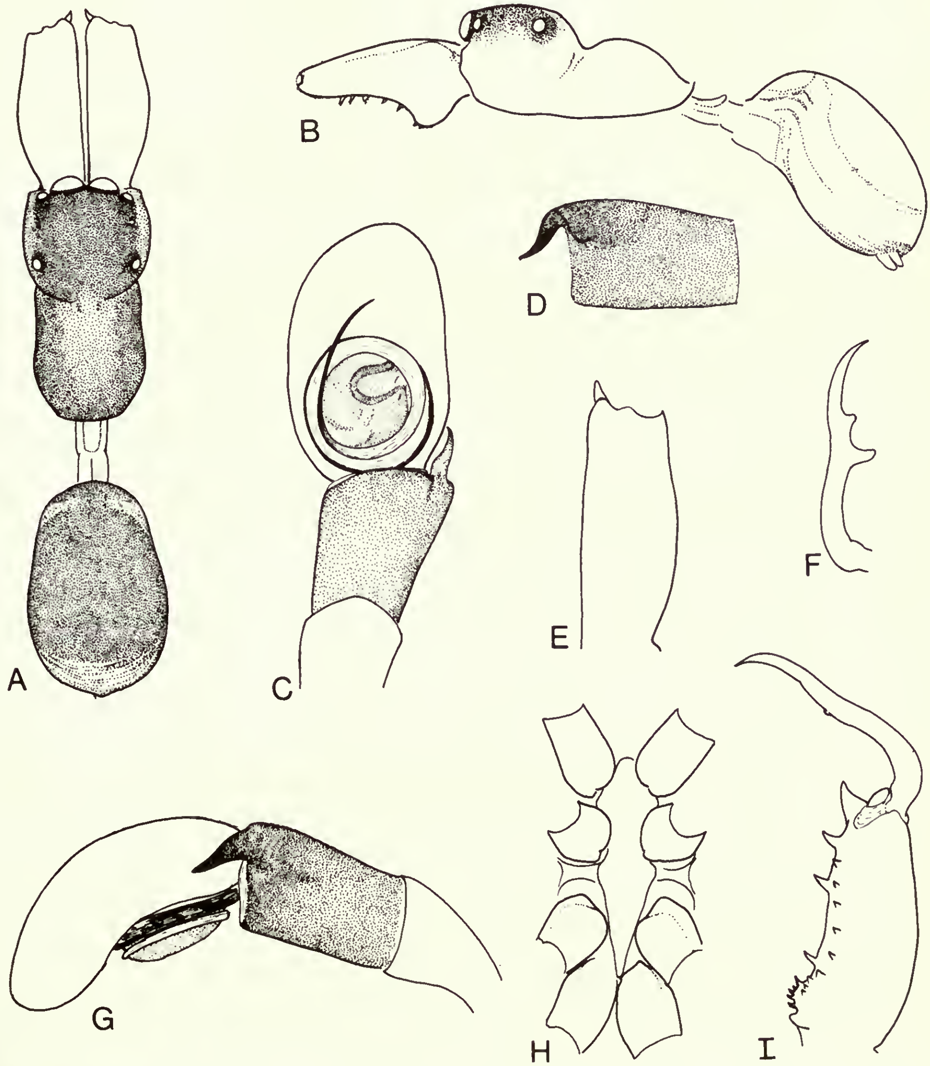

Fig. 51 *Myrmarachne dundoensis* sp. n. Holotype ♂: (A) dorsal view; (B) lateral view; (C) palp, ventral view; (E) chelicera, dorsal view; (F) fang; (G) palp, lateral view; (H) sternum; (I) chelicera, ventral view. Paratype ♂: (D) palpal tibia showing flange and more sinuous apophysis.

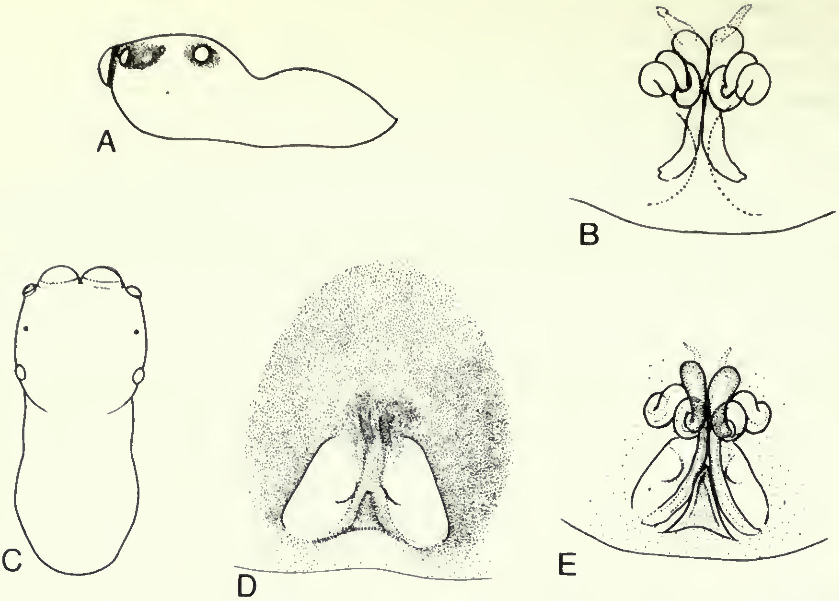

Fig. 52 *Myrmarachne dundoensis* sp. n. Paratype ♀: (A) carapace lateral view; (B) vulva, dorsal view; (C) carapace, dorsal view; (D) epigyne, ventral view; (E) vulva, ventral view.

lanceolate hairs. *Legs*: as in ♂ but coxae I and venter of trochanters I whitish yellow. *Epigyne* (Fig. 52B, D, E): spermathecae relatively complex.

Dimensions: total length 5·15–6·76 mm, carapace length 2·56–2·96 mm. *Ratios*: AM : AL : PM : PL: 9 : 4 : 1 : 4, AL–PM–PL: 7–7; a: 1·02–1·04, b: 1·02–1·04, c: 0·33–0·35, e: 0·92–1·02 (10♀ examined).

BIOLOGY. *M. dundoensis* has been found in association with *Camponotus* ants and I have collected both sexes from silk cells spun on blades of grass. Two cells contained females and eggs. One had 21 cream coloured eggs, all at an early stage of development; the second contained 4 eggs, 7 embryos and 13 first instar spiderlings. The eggs showed little sign of development and may have been sterile, but the embryos although still within the chorion were well advanced and probably about to hatch. The spiderlings were light yellow with blackish markings and pink eyes but the carapace and abdomen were not constricted. Some individuals were darker than others but none of them had moulted although there were plenty of spent chorions within the sac.

DISTRIBUTION. Angola, Botswana.

MATERIAL EXAMINED. Holotype ♂, ANGOLA, Dundo, swept from vegetation, 2.xi.1970 (*Local collector*, Ang. 22579.1) (MD, Dundo). Paratypes: ANGOLA: 1♂, data as for holotype; Dundo, swept from vegetation, 1♂, 4.x.1970 (*L. Carvalho*, Ang. 22479.1) (BMNH). BOTSWANA: Maun, dried out lagoon, nr Maphaneng Pan, 1♂, 3♀, 27.ii.1976 (*A. Russell-Smith & F. Wanless*); Maun, Thamalakane River, in grassland, 2♀, 2♂, 12.iii, 1♂, 17.iii, 1♂, 22.iii.1976 (*A. Russell-Smith & F. Wanless*); Moshi, Moshi bridge, flood plain grassland, 1♀ with eggs, 10.iii.1976 (*A. Russell-Smith & F. Wanless*); Manxunyane Lagoon, nr Maun, 2♀, 1♂, 4.iii, 1♂, 1♀, 1.iv.1976 (*A. Russell-Smith & F. Wanless*); Mboma Island, flood plain grassland, 1♀ with eggs, 14.iii.1976 (*A. Russell-Smith & F. Wanless*); Maphaneng Pan, nr Maun, 2♀, 1♂, 1.iv.1975 (*A. Russell-Smith*); Botletle River, about 10 miles S of Maun, sweeping in riverine woodland, 2♂, 5.iii.1976 (*A. Russell-Smith & F. Wanless*) (BMNH).

ETYMOLOGY. The specific name refers to the town in which the holotype was collected.

Myrmarachne foreli Lessert

(Fig. 53A–L)

Myrmarachne foreli Lessert, 1925b : 342, ♂. Holotype ♂, South Africa, Natal, Umbilo (NM, Pietermartizburg) [Examined]. Roewer, 1954 : 942. Bonnet, 1957 : 3002. Roewer, 1965 : 69. Prószyński, 1971b : 437.

Diagnosis. *M. foreli* is a distinctive species readily separated from other members of the *formicaria*-group by its body form (Fig. 53B, K). It is, however, reminiscent of *M. ichneumon* (Simon), which belongs to the *tristis*-group.

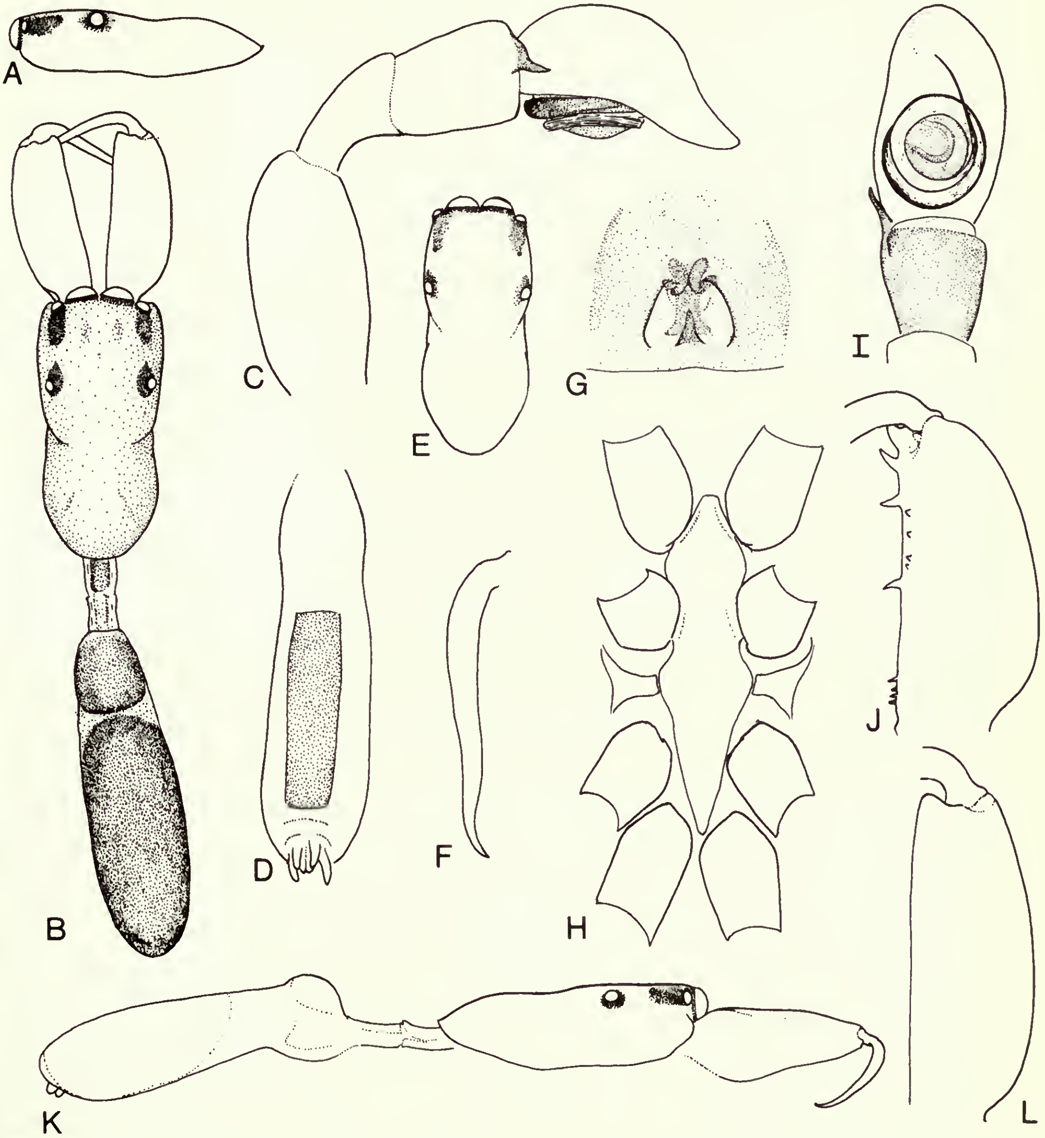

Fig. 53 *Myrmarachne foreli* Lessert. ♂: (B) dorsal view; (C) palp, lateral view; (D) abdomen, ventral view; (F) fang; (H) sternum; (I) palp, ventral view; (J) chelicera, ventral view; (K) lateral view; (L) chelicera, dorsal view. ♀: (A) carapace, lateral view; (E) carapace, dorsal view; (G) epigyne, ventral view.

MALE. *Carapace* (Fig. 53B, K): punctured-reticulate; orange-brown. *Eyes*: subcontiguous with apices procurved, sparsely fringed with white hairs. *Clypeus*: fringed with whitish hairs. *Chelicerae* (Fig. 53F, J, L): rugulose with furrows; orange-brown with metallic sheen; fang apophysis lacking. *Maxillae and Libium*: orange-brown. *Sternum* (Fig. 53H): orange-brown with darker margins. *Abdomen* (Fig. 53B, D, K): greyish with dorsal and ventral scuta mottled brownish black. *Legs*: femora I and IV enlarged; light orange-brown but tarsi and metatarsi I darker; ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 1. *Palp* (Fig. 53C, I): femora slightly enlarged.

Dimensions: total length 4·8–6·1 mm, carapace length 1·8–2·16 mm. *Ratios*: AM : AL : PM : PL: 7 : 3·5 : 1 : 3·5, AL–PM–PL: 6–6·5; a: 0·86–1·0, b: 0·95–1·0, c: 0·34–0·36, d: 0·47–0·62, e: 0·63–0·69 (7♂ examined).

FEMALE (formerly undescribed). *Carapace* (Fig. 53A, E): orange with yellowish guanin in eye region, shiny. *Eyes*: more or less as in ♂. *Clypeus*: as in ♂. *Chelicerae*: orange, shiny; promargin and retromargin with 6 teeth. *Maxillae and Labium*: as in ♂. *Sternum*: as in ♂. *Abdomen*: light greyish orange with posterior blackish; dorsal and ventral scuta lacking. *Legs*: more or less as in ♂. *Epigyne* (Fig. 53G): small and pale.

Dimensions: total length 5·48 mm, carapace length 1·84 mm. *Ratios*: AM : AL : PM : PL: 6 : 3 : 1 : 3·5, AL–PM–PL: 6–5; a: 1·02, b: 1·01, c: 0·36, e: 0·63 (1♀ examined).

Freshly preserved males are usually brown-black but become reddish to light orange with age. However, a ♂ from Angola and another from Botswana resemble the ♀ in colour by having whitish guanin within the eye region and the posterior half of the abdomen black.

BIOLOGY. Males are blackish in life and have been collected on at least two occasions with a sweep net. Their long, narrow bodies would appear to be well adapted to life in the field layer among grasses and reeds but their colour makes them conspicuous especially when they move up and down grass stems. Lessert (1925b) reports that *foreli* closely resembles *Tetraponera natalensis* (F. Smith).

DISTRIBUTION. Angola, Botswana, Malawi, South Africa.

MATERIAL EXAMINED. Type data given in synonymy. ANGOLA: Source of the Cuflo, Sa Tchisseke, 1♂, viii.1954 (*A. B. Machado*, Ang. 4375.4) (BMNH). BOTSWANA: Maun, Thamalakane River, grassland, field layer, 2♂, 2.iii.1976, 1♂, 12.iii.1976 (*A. Russell-Smith & F. Wanless*); Manxunyane Lagoon, nr Maun, flood plain grassland, field layer, 1♂, 1♀, 4.iii.1976 (*A. Russell-Smith & F. Wanless*) (BMNH). MALAWI: Chintheche, 1♀, i–ii.1976 (*R. Jocqué*, MT 147.918) (MRAC, Tervuren). SOUTH AFRICA: Pietermaritzburg, 1♂, 1913 (*C. Akerman*) (NM, Pietermaritzburg).

Myrmarachne uvira sp. n.

(Fig. 54A–M)

DIAGNOSIS. *M. uvira* is closely related to *M. nigeriensis* sp. n. Males are distinguished by the lack of a fang apophysis and usually by the shape of the chelicerae (Fig. 54A, E). Females are best separated by the epigynes which have more complex spermathecae in this species (Fig. 54K–M).

MALE. *Carapace* (Fig. 54A, I): punctured-reticulate; brownish orange tinged with black, head darker with metallic sheen; sparsely covered with white pubescent hair with white wedge-shaped bands in constriction. *Eyes*: anteriors contiguous with apices procurved, fringed with white hairs. *Clypeus*: fringed with whitish hairs. *Chelicerae* (Fig. 54D–F): strongly rugulose with furrows; orange-brown with metallic sheen; fang apophysis lacking. *Maxillae and Labium*: yellow-brown tinged with black. *Sternum* (Fig. 54J): yellow-brown tinged with black. *Abdomen* (Fig. 54A, I): mottled yellow-brown and black with dark orange-brown scuta; clothed with white pubescent hair. *Legs*: legs I tarsi yellowish; metatarsi brown-black; remaining segments yellowish with black lateral streaks. Legs II similar to I but metatarsi yellowish. Legs III brown-black but tarsi and venter of patellae yellow-brown. Legs IV as III but trochanters and coxae whitish, the latter with blackish sides. Ventral spination of legs I: metatarsi 2–2, tibiae usually 2–2–2–2, patellae 1. *Palp* (Fig. 54C, G): tibial apophysis slender.

Dimensions: total length 3·6–5·12 mm, carapace length 1·6–2·16 mm. *Ratios*: AM : AL :

PM : PL: 6 : 3 : 1 : 3, AL–PM–PL: 5·5–5; a: 0·99–1·02, b: 1·0–1·02, c: 0·38–0·41, d: 0·49–0·62, e: 1·04–1·20 (10♂ examined).

FEMALE. *Carapace* (Fig. 54B, H): more or less as in ♂. *Eyes*: as in ♂. *Clypeus*: as in ♂. *Chelicerae*: rugulose with weak, proximal, prolateral keels; orange-brown, shiny; promargin with 6 teeth, retromargin with 5 or 6. *Maxillae and Labium*: as in ♂. *Sternum*: blackish, stippled with brownish orange. *Abdomen* (Fig. 54B): mottled brownish black with oblique whitish yellow bands laterally and obscure dorsal chevrons; sparsely covered with white pubescent hair. *Legs*: more or less as in ♂ but tibiae I with 2–2–2–2–2 spines. *Epigyne* (Fig. 54K–M).

Dimensions: total length 4·12–5·16 mm, carapace length 1·64–2·16 mm. *Ratios*: AM : AL : PM : PL: 7 : 4 : 1·5 : 4, AL–PM–PL: 6–6; a: 1·02, b: 1·02, c: 0·37–0·39, e: 0·98–1·0 (10♀ examined).

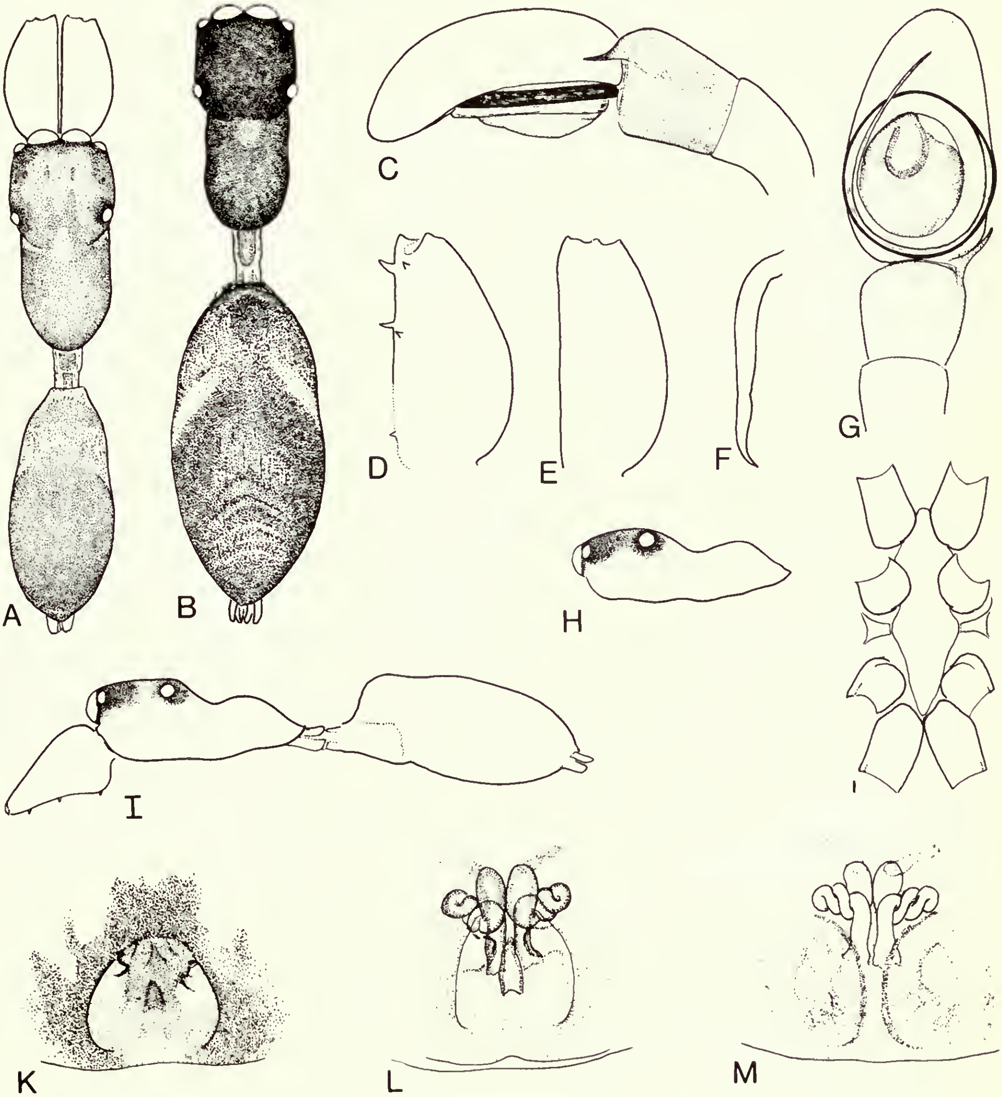

Fig. 54 *Myrmarachne uvira* sp. n. Holotype ♂: (A) dorsal view; (C) palp, lateral view; (D) chelicera, ventral view; (E) chelicera, dorsal view; (F) fang; (G) palp, ventral view; (I) lateral view; (J) sternum. Paratype ♀: (B) dorsal view; (H) carapace, lateral view; (K) epigyne, ventral view; (L) vulva, ventral view; (M) vulva, dorsal view.

BIOLOGY. *M. uvira* is an active species whose quick, jerky movements and waving front legs are very ant-like. At rest, the ant-like stance is maintained with the body held well above the ground but the tip of the abdomen almost touching and gently undulating from side to side. In courtship (seen once in captivity) the ♂ approaches the ♀ poised on three pairs of legs, with the first pair stretched outwards at an angle of about 45° but with the tarsi and metatarsi pointing down. In this pose he runs about after the ♀ frequently approaching with a side-stepping motion. The ♀ which was not receptive, refused the ♂ by either running away or indulging in vigorous palp tapping when at rest, but occasionally adopting an aggressive posture by facing the ♂ with legs I raised (F. Wanless, unpublished observations). *M. uvira* is believed to mimic *Camponotus sericeus* (Fab.) in Ghana (see Material examined).

DISTRIBUTION. Botswana, Ghana, Kenya, Tanzania, Zaire.

MATERIAL EXAMINED. Holotype ♂, ZAIRE, Uvira, in hymenopteran nest, 7.ix.1959 (*G. Marlier*, MT 116276) (MRAC, Tervuren). Paratypes: BOTSWANA: Maun, Thamalakane River, grassland, 6♂, 1♀, iv–i.1975/76 (*A. Russell-Smith*); 12♂, 8♀, iii.1976 (*A. Russell-Smith & F. Wanless*); Island Safari Lodge, nr Maun, riverine forest, 2♀, 21.ix.1975 (*A. Russell-Smith*); Borro River, Dandridge House, nr Maun, flood plain grassland, ground layer, 1♀, 29.iii.1976 (*A. Russell-Smith & F. Wanless*); Maun, dried out lagoon, nr Maphaneng Pan, 6♂, 4♀, 27.ii.1976 (*A. Russell-Smith & F. Wanless*); Manxunyane Lagoon, nr Maun, 1♀, 1.iv.1976 (*A. Russell-Smith & F. Wanless*) (BMNH). GHANA: Nungua, 1♂, 25.v.1973 (*M. Edmunds*, vial 28) with *Camponotus sericeus* (BMNH). KENYA: Kilifi, swept from low bushes and shrubs in a hot dry sandy garden, 2♂, 1♀, 11.vii.1974 (*J. & F. Murphy*, vial 4050) (BMNH). TANZANIA: Kigoma, by railway track, 1♀, 1♂, 11.x.1959 (*J. A. L. Cooke*, 2nd Oxford Univ. Expd.) (BMNH). ZAIRE: Congo da Lemba, 1♂, 1917 (*R. Mayne*, MT 130772) (MRAC, Tervuren).

ETYMOLOGY. The specific name is a noun in apposition taken from the region where the holotype was collected.

Myrmarachne nigeriensis sp. n.

(Figs 55A–J; 56A–M)

DIAGNOSIS. *M. nigeriensis* is closely related to *M. uvira* sp. n. Males can be distinguished by the form of the chelicerae (Figs 55A, B; 56A, D, E) which are somewhat broader proximally, and by the presence of the fang apophysis. Females are separated by the epigyne (Fig. 56I, K, L) which is characterized in this species by a single loop in the proximal duct.

MALE. *Carapace* (Fig. 55A, B, G, I): punctured-reticulate; black with white wedge-shaped bands in constriction. *Eyes*: anteriors more or less contiguous with apices procurved, fringed with white hairs. *Clypeus*: sparsely fringed with white hairs. *Chelicerae* (Fig. 56A, C–H): rugulose with furrows, a strong metallic sheen under some lights; brown-orange suffused with black with black lateral keels; fang apophysis present. *Maxillae and Labium*: blackish with inner margins of maxillae and labial tip light orange. *Sternum* (Fig. 56J): blackish. *Abdomen* (Fig. 55A, B, G, I): black with poorly defined brown-black scuta; sparsely clothed with light brown hairs; anterior spinnerets black, rest dark brown. *Legs*: slender; legs I tarsi pale yellow-brown; metatarsi light brown tinged with black; tibiae and patellae light brown streaked with black; trochanters and coxae blackish, the former with yellowish venter. Legs II as I but metatarsi light brown; trochanters and coxae yellowish with black sides. Legs III tarsi light brown; metatarsi and tibiae light brown with blackish sides; other segments black-brown but venter of patellae yellowish. Legs IV as III but sides of tibiae blackish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 1. *Palp* (Fig. 55D, E, H, J).

Dimensions: total length 3·3–4·76 mm, carapace length 1·58–1·96 mm. *Ratios*: AM : AL : PM : PL: 8 : 5 : 1·3 : 4·5, AL–PM–PL: 7·5–4·8; a: 1·02–1·04, b: 1·02–1·08, c: 0·42–0·44, d: 0·35–0·45, e: 0·85–0·95 (8♂ examined).

FEMALE. *Carapace* (Fig. 55C, F): orange-brown suffused with black. *Eyes*: more or less as in ♂. *Clypeus*: as in ♂. *Chelicerae*: rugulose with weak proximal prolateral keels; orange, shiny; fang groove with 5 or 6 promarginal teeth and 8–10 retromarginal *Maxillae and Labium*: orange tinged with black. *Sternum*: orange-brown mottled with black. *Abdomen* (Fig. 55C): yellow-brown mottled and tinged with black with obscure chevrons posteriorly; posterior spinnerets black, others yellow-brown. *Legs*: colour as in ♂ but femora I with black streaks inside only and coxae I with venter yellowish. Ventral spination of legs I as in ♂ but metatarsi with 2–2–2–2–2–2 or 2–2–2–2–2–1–2 spines. *Epigyne* (Fig. 56I, K, L).

Dimensions: total length 4·0–5·84 mm, carapace length 1·84–2·12 mm. *Ratios*: AM : AL : PM : PL: 9 : 5 : 1·3 : 5, AL–PM–PL: 7·5–5·5; a: 1·02–1·04, b: 1·04–1·07, c: 0·41–0·44, e: 0·89–1·0 (4♀ examined).

An orange-coloured ♂ from Angola (Fig. 55B, E) has different palps with the embolus appearing to be somewhat heavier and larger. The specimen could represent a new taxon but the differences are considered to be intraspecific until additional material is available from which to make a comparison.

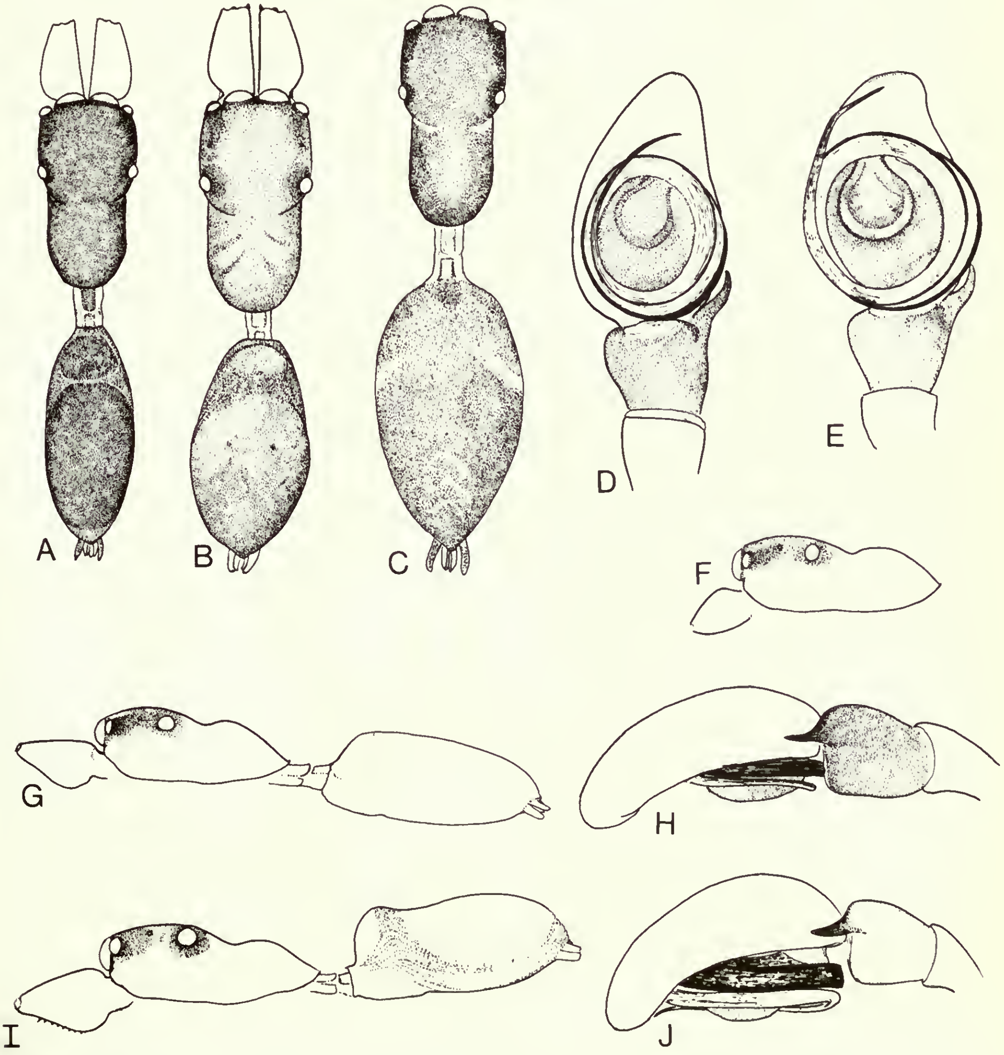

Fig. 55 *Myrmarachne nigeriensis* sp. n. Holotype ♂: (A) dorsal view; (D) palp, ventral view; (G) lateral view; (H) palp, lateral view. ♂ from Angola: (B) dorsal view; (E) palp, ventral view; (I) lateral view; (J) palp, lateral view. Paratype ♀: (C) dorsal view; (F) carapace, lateral view.

Biology. Unknown but Nigerian specimens have been found running about with *Camponotus* ants (A. Russell-Smith, pers. comm.).

Distribution. Angola, Ghana, Nigeria, São Thomé.

Material examined. Holotype ♂, Nigeria, Ibadan, International Institute for Tropical Agriculture, Centre for Overseas Pest Research site, 18.iii.1974 (*A. Russell-Smith*) (BMNH, reg. no. 1975.11.25.1). Paratypes. Angola: between Lubango and Hoque, under fallen trees, 1♂, 27.x.1949 (*A. B. Machado*, Ang. 4030) (BMNH). Ghana: Kade, pyrethrum knockdown sample from the canopy of a plot of Amelonado cocoa, 1♂, 26.i.1972, 1♂, 2♀, 13.vii.1971 (*J. D. Majer*) (BMNH). Nigeria: 3♂ same data as holotype; Ibadan, 2♀, 8.viii.1973 (*A. Russell-Smith*) (BMNH). São Thomé: 1♂ (MNHN, Paris).

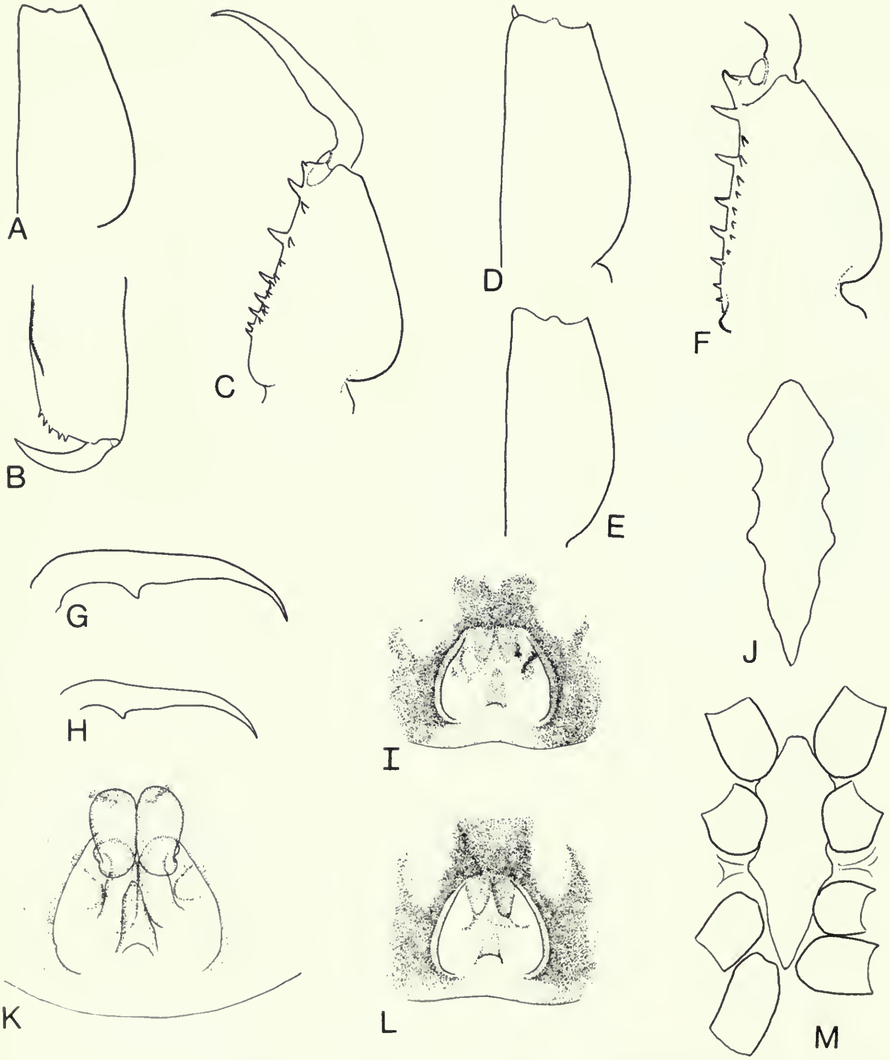

Fig. 56 *Myrmarachne nigeriensis* sp. n. Holotype ♂: (A) chelicera, dorsal view; (C) chelicera, ventral view; (H) fang; (J) sternum. ♂ from Angola: (D) chelicera, dorsal view; (F) chelicera, ventral view; (G) fang; (M) sternum. ♂ from São Thomé, (E) chelicera, dorsal view. Paratype ♀: (B) chelicera, frontal view; (I) epigyne, ventral view; (K) vulva, ventral view; (L) epigyne, ventral view of another specimen from Ibadan.

Myrmarachne vanessae sp. n.

(Fig. 57A–L)

DIAGNOSIS. *M. vanessae* is a distinctive species readily separated from other members of the *formicaria*-group by the shape of the carapace (Fig. 57A, F, G, K) and unusual markings on the carapace and sternum. In body form it closely resembles *M. richardsi* sp. n., a distinctive species in the *tristis*-group.

MALE. *Carapace* (Fig. 57F, K): punctured-reticulate in eye region with small rounded depression on each side of thoracic part; brown with blackish mottling; head slightly darker with a metallic sheen; constriction light yellow-brown and shiny under some lights. *Eyes*: AM subcontiguous, slightly further from AL with apices procurved, fringed with whitish hairs. *Clypeus*: sparsely fringed with long light brown hairs. *Chelicerae* (Fig. 57H–I): rugulose with furrows; orange

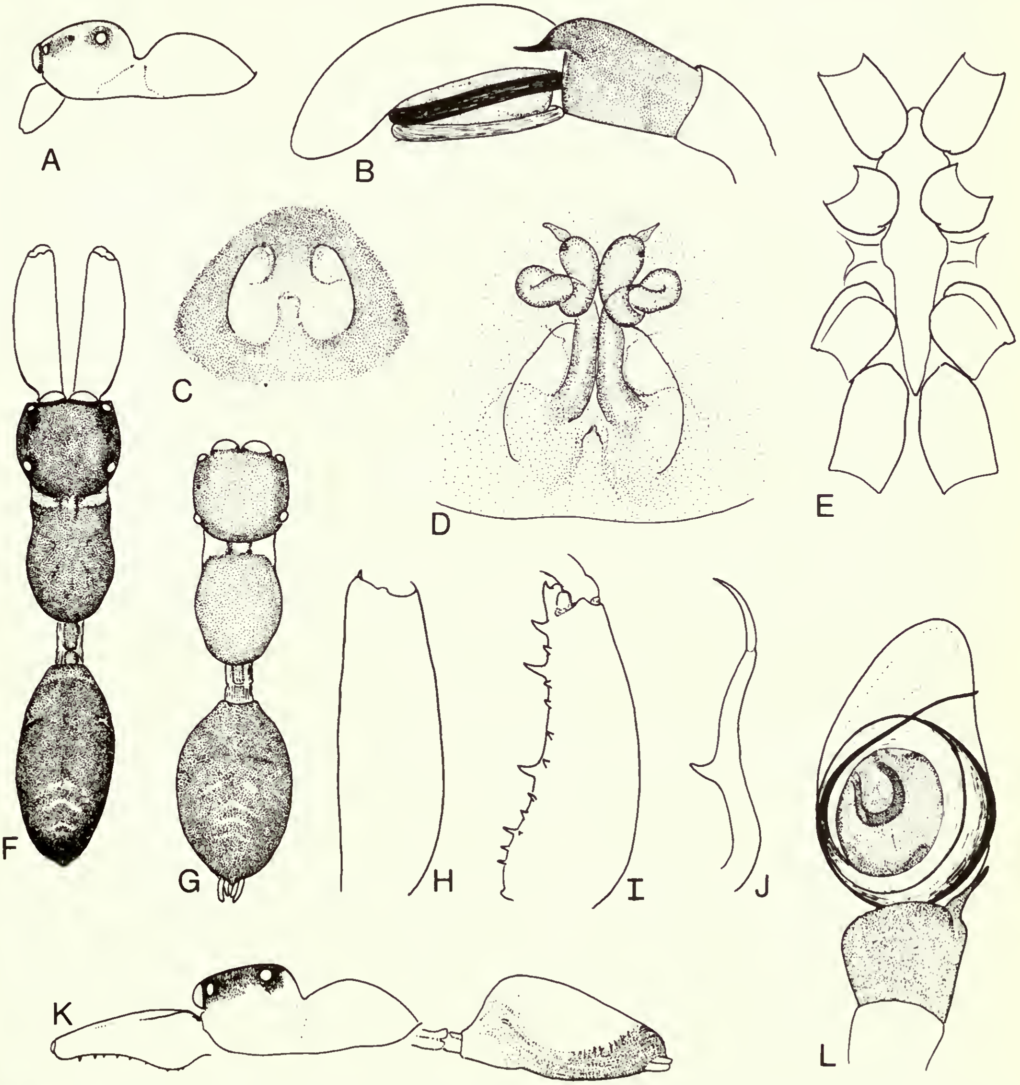

Fig. 57 *Myrmarachne vanessae* sp. n. Holotype ♂: (B) palp, lateral view; (E) sternum; (F) dorsal view; (H) chelicera, dorsal view; (I) chelicera, ventral view; (J) fang; (K) lateral view; (L) palp, ventral view. Paratype ♀: (A) carapace, lateral view; (C) epigyne ventral view; (D) vulvae, ventral view; (G) dorsal view.

with blackish mottling; fang apophysis present. *Maxillae and Labium*: blackish with inner margins of maxillae and labial tip yellow-brown. *Sternum* (Fig. 57E): anterior half yellow, posterior half black, margins orange-brown. *Abdomen* (Fig. 57F, K): blackish with contiguous scuta that are shiny dark mahogany with obscure chevrons posteriorly; sparsely clothed with fine hairs. *Legs*: slender; legs I tarsi and metatarsi orange-brown suffused with black; tibiae and patellae yellow-brown with black stripe on inner sides; coxae and trochanters blackish. Legs II as I but tarsi and metatarsi yellow-brown. Legs III brown suffused with black but tarsi, metatarsi distally and venter of patellae light yellow-brown. Legs IV brownish black with distal segments lighter; trochanters whitish yellow, with yellowish marks on patellae. Ventral spination of legs I: metatarsi 2–2–2, tibiae 2–2–2–2–2, patellae 0. *Palp* (Fig. 57B, L).

Dimensions: total length 5·2 mm, carapace length 2·56 mm. *Ratios*: AM : AL : PM : PL: 9 : 4·2 : 1 : 4·7, AL–PM–PL: 6–6; a: 0·99, b: 1·0, c: 0·33, d: 0·62, e: 0·96 (1♂ examined).

FEMALE. *Carapace* (Fig. 57A, G): olivaceous, suffused with black; constriction glistening whitish yellow with two blackish stripes enclosing a white spot mid-dorsally. *Eyes*: more or less as in ♂ but fringed with brownish hairs. *Clypeus*: fringed with long white and pale brown hairs. *Chelicerae*: rugulose; shiny, whitish yellow; fang groove with 6 retromarginal teeth (promarginal teeth not examined). *Sternum*: whitish yellow with posterior half olivaceous, suffused with black. *Abdomen* (Fig. 57G): shiny, olivaceous suffused with black with ill-defined chevrons posteriorly; sparsely covered with fine hairs, with a vague transverse line of minute greenish iridescent lanceolate hairs in region of constriction. *Legs*: slender; legs I whitish yellow with black streaks along inside of tarsi, metatarsi, tibiae and patellae and on both sides of femora. Legs II whitish yellow with black streak along inside of tibiae, patellae and distal half of femora. Legs III olivaceous suffused with black with tarsi, metatarsi distally and venter of patellae whitish. Legs IV coxae, femora, tibiae and metatarsi olivaceous, tinged with black, the last two segments lighter distally; trochanters whitish with black distal spot inside; patellae whitish with dorsal distal part black; tarsi whitish with black sides. Ventral spination of legs I as in ♂. *Epigyne* (Fig. 57C, D).

Dimensions: total length 5·1 mm, carapace length 2·48 mm. *Ratios*: AM : AL : PM : PL: 9 : 4 : 1·2 : 4·5, AL–PM–PL: 6–6, a: 1·01, b: 1·03, c: 0·33, e: 0·87 (1♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Ivory Coast.

MATERIAL EXAMINED. Holotype ♂, IVORY COAST, nr Bandama, Lamto Field Station, 20.ix.1967 (*J. Jezequel*) (MNHN, Paris). Paratype. 1♀, same data as holotype.

ETYMOLOGY. This species is named after my youngest daughter Vanessa Wanless.

Myrmarachne russellsmithi sp. n.

(Fig. 58A–H)

DIAGNOSIS. *M. russellsmithi* is closely related to *M. kitale* sp. n., and *M. inflatipalpis* sp. n. but may be distinguished by the form of the carapace (Fig. 58A, B) and palp structure (Fig. 58C, E).

FEMALE. Unknown.

MALE. *Carapace* (Fig. 58A, B): finely rugulose in eye region; orange-brown lightly mottled with black, glossy. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: sparsely fringed with long fine hairs. *Chelicerae* (Fig. 58D, F, G): finely rugulose; yellow-brown with black lateral keels, glossy; fang apophysis present, also a distinct distal swelling. *Maxillae*: yellow-brown tinged with black. *Labium*: orange-brown. *Sternum* (Fig. 58H): orange-brown with blackish stippling, glossy. *Abdomen* (Fig. 58A, B): mottled brownish black with glossy, dark mahogany scuta. *Legs*: glossy under some lights; legs I tarsi and metatarsi brownish black; other segments light yellowish with blackish lateral streaks. Legs II light yellow-brown with black streaks on inside of tibiae and patellae and on both sides of femora. Legs III brown tinged with black but tarsi and distal half of metatarsi paler. Legs IV as III but venter of patellae white and coxae and trochanters white with blackish markings. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–1; patellae 0. *Palp* (Fig. 58C, E): tegulum very small.

Dimensions: total length 3·10 mm, carapace length 1·54 mm. *Ratios*: AM : AL : PM : PL: 6 : 3 : 1 : 3, AL–PM–PL: 4·5–6; a: 0·90, b: 1·0, c: 0·41, d: 0·46, e: 0·84 (1♂ examined).

BIOLOGY. Unknown but the only known specimen was clearly found away from its natural habitat, as it probably lives in the field and shrub layers where it presumably mimics *Crematogaster* ants.

DISTRIBUTION. Nigeria.

MATERIAL EXAMINED. Holotype ♂, NIGERIA, Ibadan, International Institute for Tropical Agriculture, Building 400, 3.iv.1973 (*A. Russell-Smith*), found on concrete roadway surrounded by closely mowed grass lawns (BMNH, reg. no. 1975.1.31.10).

ETYMOLOGY. This species is named in honour of the collector Mr A. Russell-Smith.

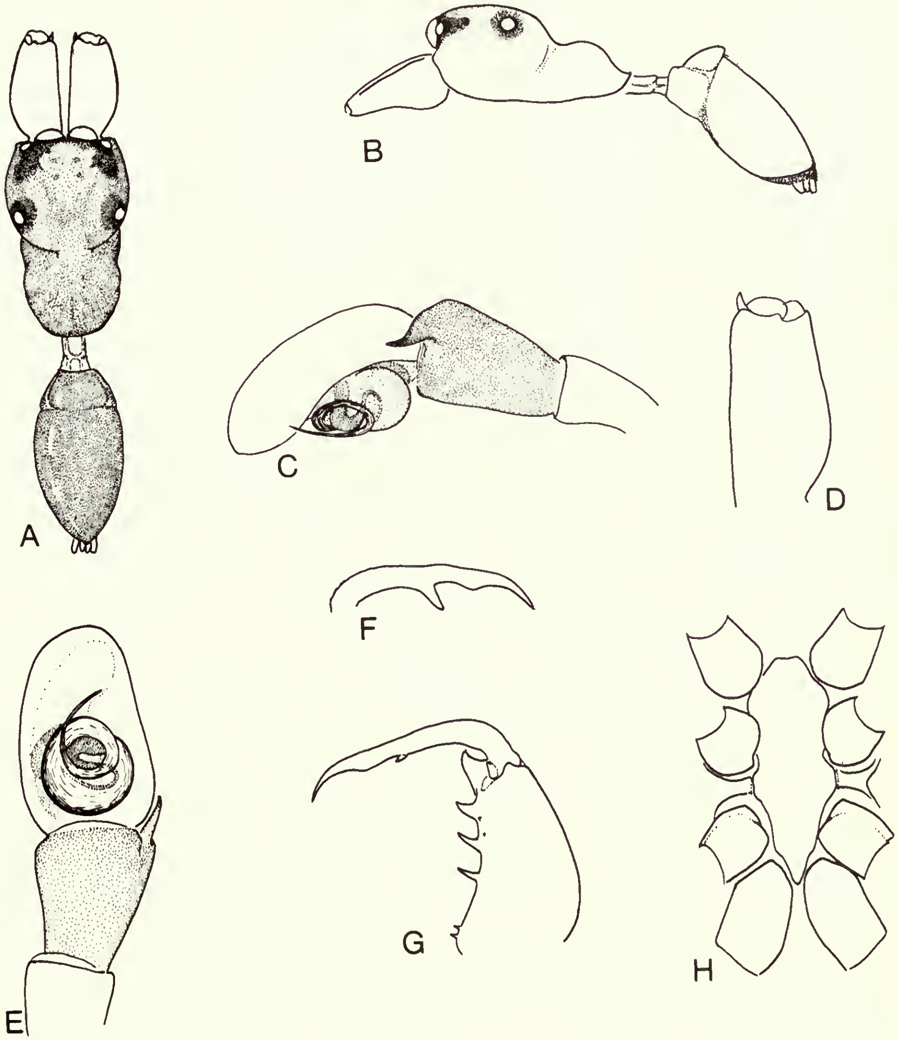

Fig. 58 *Myrmarachne russellsmithi* sp. n. Holotype ♂: (A) dorsal view; (B) lateral view; (C) palp, lateral view; (D) chelicera, dorsal view; (E) palp, ventral view; (F) fang; (G) chelicera, ventral view; (H) sternum.

Myrmarachne kitale sp. n.

(Figs 59B, D, E, H, I; 60B, D, H–M)

DIAGNOSIS. *M. kitale* is closely related to *M. russellsmithi* sp. n. and *M. inflatipalpis* sp. n. but may be distinguished by the carapace shape (Fig. 59H, I) and palp structure (Figs 59D; 60B) which is somewhat intermediate between that of *russellsmithi* and *inflatipalpis*. Females can be distinguished from other females in the *formicaria*-group by the carapace shape (Fig. 59E, H) and epigyne structure (Fig. 60K–M).

MALE. *Carapace* (Fig. 59B, I): punctured-reticulate in eye region; orange-brown tinged with black; shiny, with white wedge-shaped bands in constriction which is outlined by darker edges dorsally. *Eyes*: more or less contiguous with apices procurved, fringed with fine hairs. *Clypeus*:

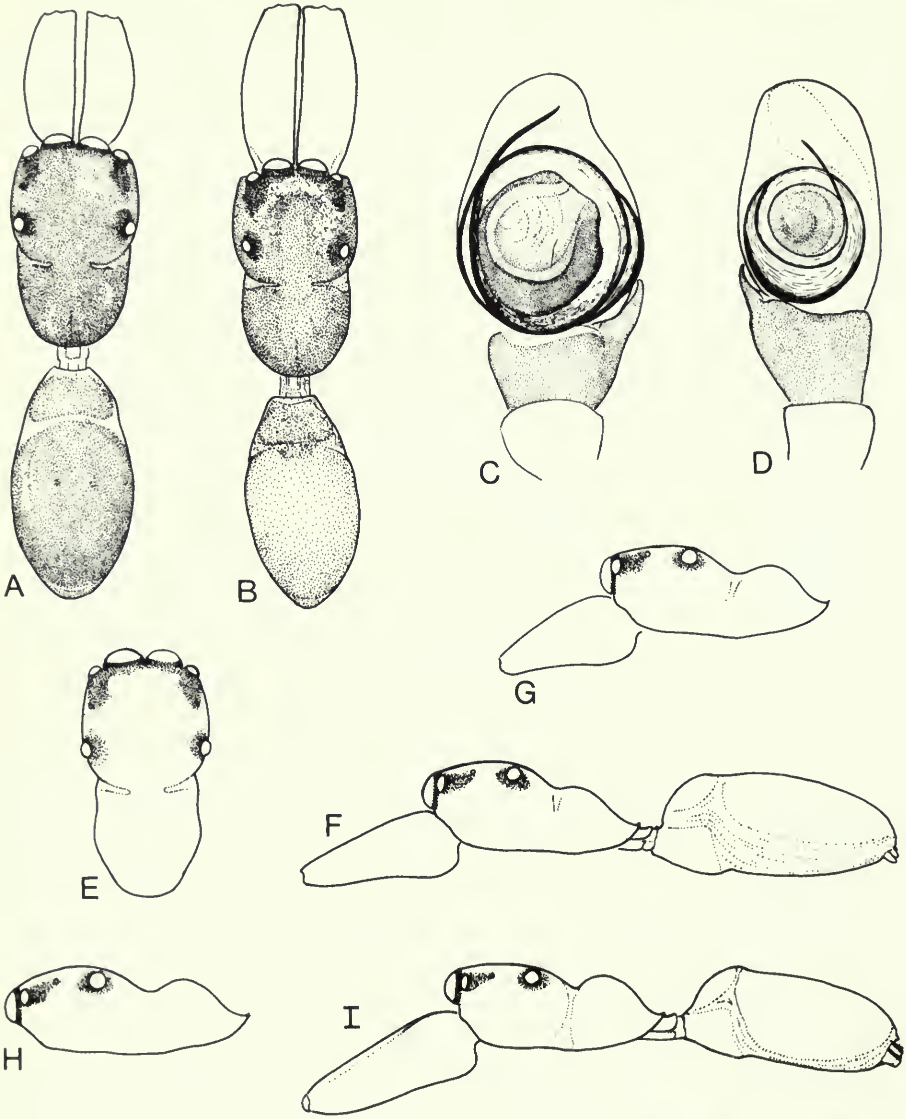

Fig. 59 (A, C, F, G) *Myrmarachne inflatipalpis* sp. n. Holotype ♂: (A) dorsal view; (C) palp, ventral view; (F) lateral view. ♂ from Botswana: (G) carapace, lateral view. (B, D, E, H, I) *Myrmarachne kitale* sp. n. Holotype ♂: (B) dorsal view; (D) palp, ventral view; (I) lateral view. Paratype ♀: (E) carapace, dorsal view; (H) carapace, lateral view.

fringed with fine hairs. *Chelicerae* (Fig. 60D, H, I): rugulose with furrows; orange-brown, shiny; fang apophysis present. *Maxillae and Labium*: orange-brown tinged with blackish with inner margins of maxillae and labial tip lighter. *Sternum* (Fig. 60J): orange-brown tinged with black. *Abdomen* (Fig. 59B, I): light yellow-brown with blackish mottling and glossy orange-brown scuta. *Legs*: legs I tarsi yellow-brown; metatarsi blackish; tibiae and patellae light yellow-brown with blackish lateral streaks; femora dark brownish orange; trochanters and coxae light yellowish, the former with blackish sides. Legs II similar to I but metatarsi and femora light yellow, the latter with dark brown sides. Legs III dark orange-brown with metatarsi distally, tibiae distally and venter of patellae yellow-brown. Legs IV as III but trochanters and coxae marked with whitish yellow. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2, patellae 0. *Palp* (Figs 59D; 60B).

Dimensions: total length 4·54 mm, carapace length 1·78 mm. *Ratios*: AM : AL : PM : PL: 6 : 3 : 1 : 3, AL–PM–PL: 4·5–6; a: 0·89, b: 0·93, c: 0·40, d: 0·78, e: 0·69 (1♂ examined).

Female. *Carapace* (Fig. 59E, H): similar to ♂ but orange. *Eyes*: more or less as in ♂. *Clypeus*: as in ♂. *Chelicerae*: rugulose; light orange, shiny; fang groove with 7 promarginal and 6 retromarginal teeth. *Maxillae and Labium*: as in ♂. *Sternum*: light orange with darker margins, shiny. *Abdomen*: greyish white tinged with pink, with darker poorly defined anterior scutum and 2 pairs of impressed dots dorsally; posterior spinnerets brown-black, anteriors light brown, medians whitish. *Legs*: legs I tarsi light yellowish; metatarsi black; remaining segments light yellowish but with black streaks along inside of tibae, patellae and trochanters and on both sides of femora and coxae. Legs II light yellowish with inner black streaks except on metatarsi and tarsi. Legs III orange with tibiae darker, tarsi and metatarsi lighter. Legs IV as III but venter of patellae, trochanters and coxae whitish yellow. Ventral spination of legs I: as in ♂ but tibiae 2–2–2, patellae 1. *Epigyne* (Fig. 60K–M).

Dimensions: total length 3·76–4·54 mm, carapace length 1·68–1·78 mm. *Ratios*: AM : AL : PM : PL: 7 : 3·5 : 1 : 4, AL–PM–PL: 5·5–6; a: 1·02, b: 1·02, c: 0·40–0·41, e: 0·69–0·71 (4♀ examined).

One female has blackish chevrons on the abdomen, while another from Naro Moru is much darker with a blackish abdomen.

Biology. Unknown but probably mimics *Crematogaster* ants.

Distribution. Kenya.

Material examined. Holotype ♂, Kenya, beaten from shrubs in garden of a farm about 20 miles north of Kitale, 6500 feet, 20.vii.1974 (*J. & F. Murphy*, vial 3599) (BMNH, reg. no. 1977.4.21.34). Paratypes. Kenya: Lake Naivasha, beaten from Kei apple hedge about 35 yards from the lake, 6200 feet, 2♀, 3.vii.1974 (*J. & F. Murphy*, vial 3888); Naro Moro, 6500 feet, 1♀, 17.viii.1974 (*J. & F. Murphy*, vial 4245); Kitale, Copper Dam, from cell on reed at edge of small fresh water dam, 1♀, 16.viii.1972 (*J. & F. Murphy*, vial 1950) (BMNH).

Etymology. The specific name is a noun in apposition taken from the region where the holotype was found.

Myrmarachne inflatipalpis sp. n.

(Figs 59A, C, F, G; 60A, C, E–G)

Diagnosis. *M. inflatipalpis* is closely related to *M. kitale* sp. n. and *M. russellsmithi* sp. n. but may be distinguished by the rather bulbous tegulum (Fig. 60A) and its correspondingly large seminal reservoir.

Female. Unknown.

Male. *Carapace* (Fig. 59A, G, F): punctured-reticulate; orange-brown, shiny with white wedge-shaped bands in constriction. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: sparsely fringed with long, fine hairs. *Chelicerae* (Fig. 60C, F, G): rugulose with furrows; orange-brown with blackish lateral keels, shiny; fang apophysis present. *Maxillae and Labium*: light orange-brown with inner distal margins of maxillae and labial tip lighter.

Sternum (Fig. 60E): orange with darker margins. *Abdomen* (Fig. 59A, F): mottled yellow-brown and black with glossy brownish orange scuta separated by a scanty white haired band. *Legs*: femora I slightly enlarged. Legs I tarsi, trochanters and coxae yellow-brown; metatarsi blackish; tibiae and patellae yellow-brown with darker sides; femora brown. Legs II generally yellow-brown with darker sides except on tarsi and metatarsi. Legs III brown tinged with black but tarsi and metatarsi distally yellow-brown. Legs IV as III but venter of patellae, trochanters and coxae light yellow. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2, patellae 1. *Palp* (Figs 59C; 60A): tegulum rather bulbous ventrally.

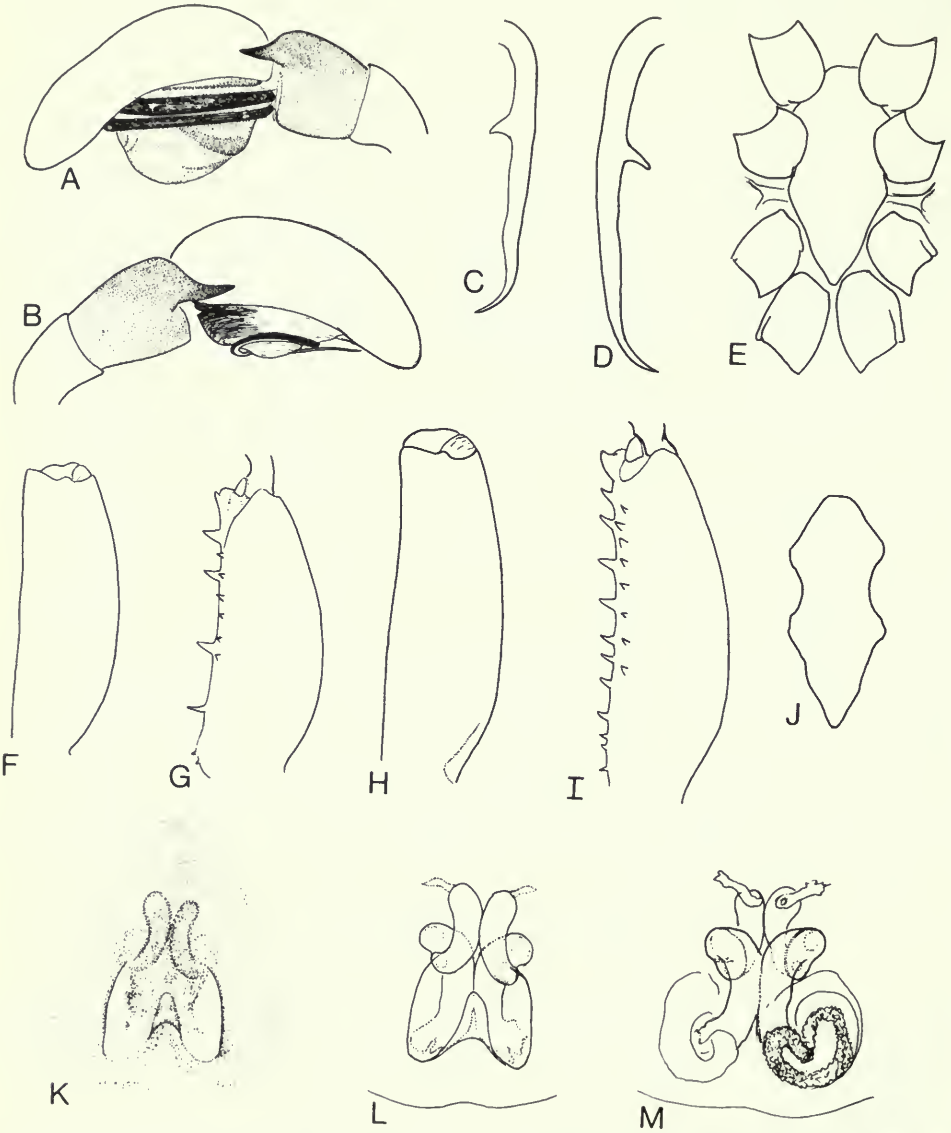

Fig. 60 (A, C, E–G) *Myrmarachne inflatipalpis* sp. n. Holotype ♂: (A) palp, lateral view; (C) fang; (E) sternum; (F) chelicera, dorsal view; (G) chelicera, ventral view. (B, D, H–M) *Myrmarachne kitale* sp. n. Holotype ♂: (B) palp, lateral view; (D) fang; (H) chelicera, dorsal view; (I) chelicera, ventral view; (J) sternum. Paratype ♀: (K) epigyne, ventral view; (L) vulva, ventral view; (M) vulva, dorsal view.

Dimensions: total length 3·08–4·2 mm, carapace length 1·42–1·96 mm. *Ratios*: AM : AL : PM : PL: 7 : 3·5 : 1 : 3·5, AL–PM–PL: 5–5·3; a: 0·86–1·0, b: 0·92–1·0, c: 0·38–0·42, d: 0·57–0·80, e: 0·66–0·75 (6♂ examined).

Freshly preserved specimens vary from orange to dark brown and some individuals appear to be more glossy than others. The carapace shows differences in shape (Fig. 59G) with the thoracic part forming a more distinct 'hump' in some individuals.

BIOLOGY. *M. inflatipalpis* has been found running about on shrubs with a species of *Crematogaster* ant whose appearance and behaviour it closely mimics. In life both ant and spider are reddish with shiny black pointed 'abdomens' that are held in a reflexed position when disturbed. The movements of the spider are ant-like and there is no doubt that it mimics both the gait and defensive behaviour of the ant although unlike the ant it does not have a defensive secretion.

DISTRIBUTION. Botswana, Malawi, South Africa.

MATERIAL EXAMINED. Holotype ♂, SOUTH AFRICA, Transvaal, Pietersburg District, Letaba Basin from the river bank, ix.1960 (*N. Leleup*, MT 132199) (MRAC, Tervuren). Paratypes. BOTSWANA: Kgwebe Hills, ground layer, 1♂, 31.iii.1976 (*A. Russell-Smith & F. Wanless*); nr Gadikwee Lagoon, 1♂, 16.x.1975 (*A. Russell-Smith*) (BMNH). MALAWI: Zomba, 1♂, x.1961 (*R. C. H. Sweeney*) (BMNH). SOUTH AFRICA: Pretoria, 1♂ (MNHN, Paris); Pietermaritzburg, 1 Fettes Road, on garden lawn, 1♂, 18.iv.1976 (*A. Russell-Smith & F. Wanless*) (NM, Pietermaritzburg); Magaliesburg, Magalies R., on shrubs by river bank, 6 subadults, 11.iv.1976 (*G. Newlands, A. Russell-Smith & F. Wanless*) (BMNH). Pondoland, Port St Johns, 1♂, iv.1923 (*R. E. Turner*) (BMHN).

ETYMOLOGY. The specific name refers to the swollen palp of the male.

The *volatilis*-group

Species of *Myrmarachne* belonging here may be recognized by the following combination of characters. Males: lower distal margin of fang groove lobate (Fig. 64C, D); tibial apophysis more or less sinuous; flange lacking (Fig. 63I, J); proximal ectal margin of cymbium not de-

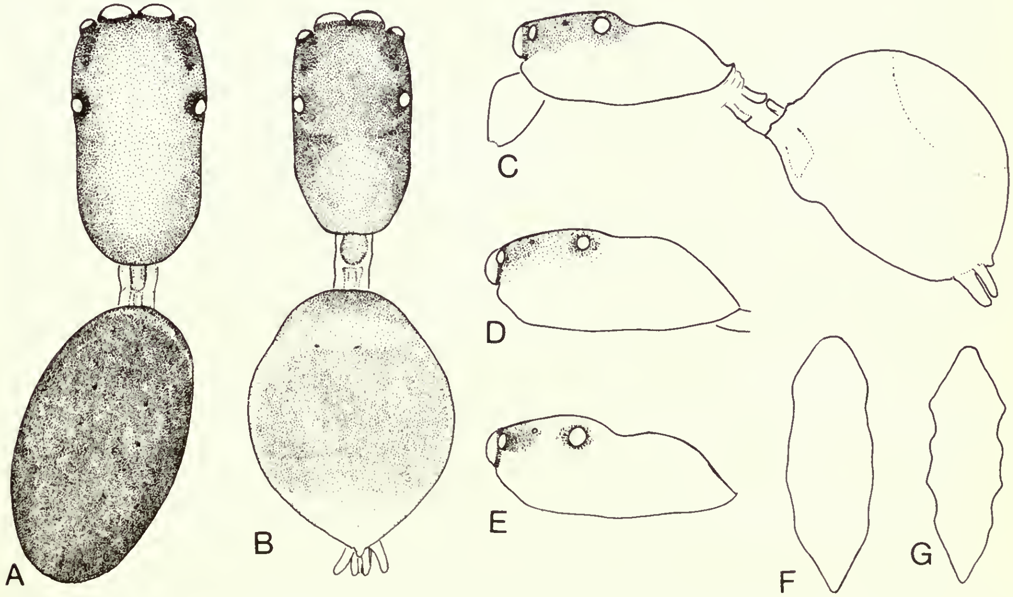

Fig. 61 (A, D, E, F) *Myrmarachne volatilis* (Peckham & Peckham). Lectotype ♀: (A) dorsal view; (D) carapace, lateral view; (F) sternum. ♀ from Est Antsirabe: (E) carapace, lateral view. (B, C, G) *Myrmarachne globosa* sp. n. Holotype ♀: (B) dorsal view; (C) lateral view; (G) sternum.

pressed or protuberant; seminal reservoir large and marginate (Fig. 63B). Females: median subtriangular pouch present; spermathecae simple, without loops or twists (Fig. 62).

This group is comprised of 6 species in the Ethiopian region, 2 from Madagascar and 4 from Africa, but it is also known to occur in the Oriental and Australasian regions.

The Ethiopian species show a wide variation in body form and can, for convenience, be divided into two subgroups. The first contains four closely related species, *M. volatilis* (Peckham & Peckham), *M. globosa* sp. n., *M. kilifi* sp. n. and *M. laurentina* Bacelar, that are characterized by a rather heavy carapace, shallow postocular constriction and very similar genitalia. The second subgroup includes two slender species, *M. andrewi* sp. n. and *M. longiventris* (Simon), that are not closely related but are characterized by their elongate body form and low, unconstricted carapace.

Sexual dimorphism is perhaps slightly less marked in the *volatilis*-group as males have relatively short chelicerae that are inclined at about 45° in *M. andrewi* and in several undescribed species from Borneo and Australia. Its affinities are uncertain but similiarities with *Belippo* are spurious,

Myrmarachne volatilis (Peckham & Peckham)

(Figs 61A, D, E, F; 62A–C)

Hermosa volatilis Peckham & Peckham, 1892 : 53, pl. 4, figs 7, 7a, 7b, 7c, ♀. LECTOTYPE ♀ (here designated), Madagascar (MCZ, Harvard) [Examined].

Myrmarachne majungae Strand, 1907 : 745, ♀. Holotype ♀, Madagascar, Majunga (MNHU, Berlin) [Examined]. Roewer, 1954 : 943; 1965 : 66. **Syn. n.**

Myrmarachne majungana: Bonnet, 1957 : 3009. Prószyński, 1971b : 439. [Unjustified emendation.]

Myrmarachne volatilis: Roewer, 1954 : 944. Bonnet, 1957 : 3014. Roewer, 1965 : 64.

DIAGNOSIS. *M. volatilis* is closely related to *M. laurentina* from South Africa but may be distinguished by the sausage-shaped spermathecae (Fig. 62A–C).

MALE. Unknown.

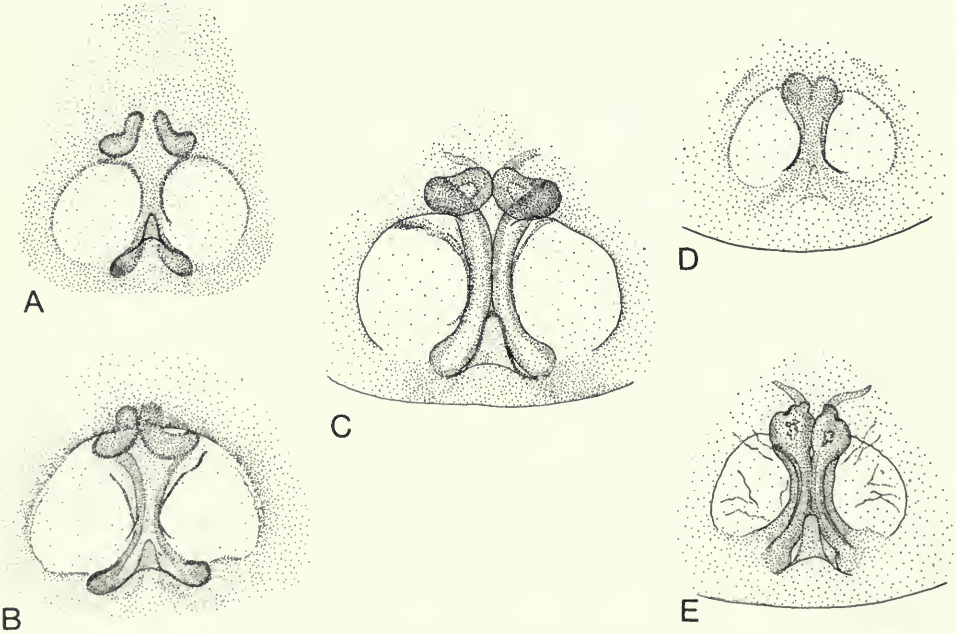

Fig. 62 (A–C) *Myrmarachne volatilis* (Peckham & Peckham). Lectotype ♀: (B) epigyne, ventral view. Paralectotype ♀: (A) epigyne, ventral view. ♀ from Est Antsirabe: (C) vulva, ventral view. (D, E) *Myrmarachne globosa* sp. n. Holotype ♀: (D) epigyne, ventral view; (E) vulva, ventral view.

FEMALE. *Carapace* (Fig. 61A, E): punctured-reticulate with papillae on thoracic part; orange-brown or brown-black with scattered long white hairs. *Eyes*: anteriors subcontiguous with apices slightly procurved, fringed with white hairs. *Clypeus*: fringed with long white hairs. *Chelicerae*: robust; rugulose with furrows; orange-brown; promargin with 7 or 8 teeth, retromargin with 8 or 9. *Maxillae and Labium*: brown with inner margins of maxillae and labial tip paler. *Sternum* (Fig. 61F): light brown. *Abdomen* (Fig. 61A): mottled brownish orange and black with 2 pairs of impressed spots dorsally. *Legs*: legs I tarsi and metatarsi dark orange-brown; tibiae and patellae yellow-orange with brownish orange sides; femora orange-brown with venter light yellowish distally; trochanters brownish orange; coxae light yellowish. Legs II as I but tarsi, metatarsi and coxae orange-brown. Legs III orange-brown. Legs IV as III but trochanters and patellae marked with yellowish. Ventral spination of legs I: metatarsi 2–2; tibiae 2–2–2–2, patellae 0. *Epigyne* (Fig. 62A–C): position of spermathecae and pouch slightly variable.

Dimensions: total length 5·1–7·1 mm, carapace length 2·12 mm. *Ratios*: AM : AL : PM : PL: 10·5 : 5 : 1 : 5, AL–PM–PL: 9–11; a: 0·93–1·02, b: 1·0–1·02, c: 0·39–0·44, e: 0·74–0·90 (4♀ examined).

A large female from Est Antsirabe has a deeper postocular constriction (Fig. 61E) with poorly defined chevrons on the abdomen.

BIOLOGY. Unknown.

DISTRIBUTION. Madagascar.

MATERIAL EXAMINED. Type data given in synonymy. MADAGASCAR: Est Antsirabe, 1♀, 10.xi.1970 (*J. Gossuin*, MT 142531) (MRAC, Tervuren). Tamatave, 1♀ (MNHN, Paris).

Myrmarachne globosa sp. n.

(Figs 61B, C, G; 62D, E; Pl. 3a, b)

DIAGNOSIS. *M. globosa* is closely related to *M. volatilis* Peckham & Peckham and *M. laurentina* Bacelar but can be readily distinguished by the form of sculpturing in the eye region (i.e. punctured-reticulate between moderately dense piliferous papillae, Pl. 3a, b).

MALE. Unknown.

FEMALE. *Carapace* (Fig. 61B, C; Pl. 3a, b): punctured-reticulate between moderately dense piliferous papillae in eye region and punctured reticulate with papillae in thoracic part; orange to light orange with white pubescent hair. *Eyes*: anteriors subcontiguous with apices slightly procurved, fringed with white hairs. *Clypeus*: fringed with white and light brown hairs. *Chelicerae*: rugulose; orange; promargin with 6 teeth, retromargin with 14. *Maxillae and Labium*: light orange. *Sternum* (Fig. 61G): light orange with darker margins. *Abdomen* (Fig. 61B, C); rubbed and probably full of eggs; whitish yellow with poorly defined light orange scutum. *Legs*: orange to whitish orange. Ventral spination of legs I: metatarsi 2–2; tibiae 2–2–2–2–2–1 or 2–2–2–2–2–2, patellae 0. *Epigyne* (Fig. 62D, E).

Dimensions: total length 7·2–7·84 mm, carapace length 3·24–3·36 mm. *Ratios*: AM : AL : PM : PL: 13 : 7 : 2 : 7, AL–PM–PL: 10–9·5, a: 1·03, b: 1·01, c: 0·41–0·42, e: 1·06–1·13 (2♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Angola, Zaire.

MATERIAL EXAMINED. Holotype ♀, ANGOLA, environs of Dundo, in litter 10–13.x.1946 (*A. B. Machado*, Ang. 71.6) (MD, Dundo). Paratype. ZAIRE: Rwankur, 1♀, 15.ii.1952 (*J. V. Leroy*, MT 78965) (MRAC, Tervuren).

ETYMOLOGY. The specific name refers to the form of the spermathecae.

Myrmarachne laurentina Bacelar

(Figs 63A, B, E, G, I; 64B, C; 65A–C, G, H)

Myrmarachne laurentina Bacelar, 1953 : 8, figs 4–8, ♂. Holotype ♂, Mozambique, Lourenço Marques (MB, Lisbon) [Examined].

DIAGNOSIS. Female *M. laurentina* are distinguished from female *M. volatilis* (Peckham & Peckham) and *M. kilifi* sp. n. by the rounded spermathecae (Fig. 65G, H) and from *M. globosa* sp. n. by the lack of piliferous papillae in the eye region. The absence of a dorsal spike on the tibial apophysis (Fig. 63I) separates male *laurentina* from a male *kilifi*. Male *volatilis* and *globosa* are unknown.

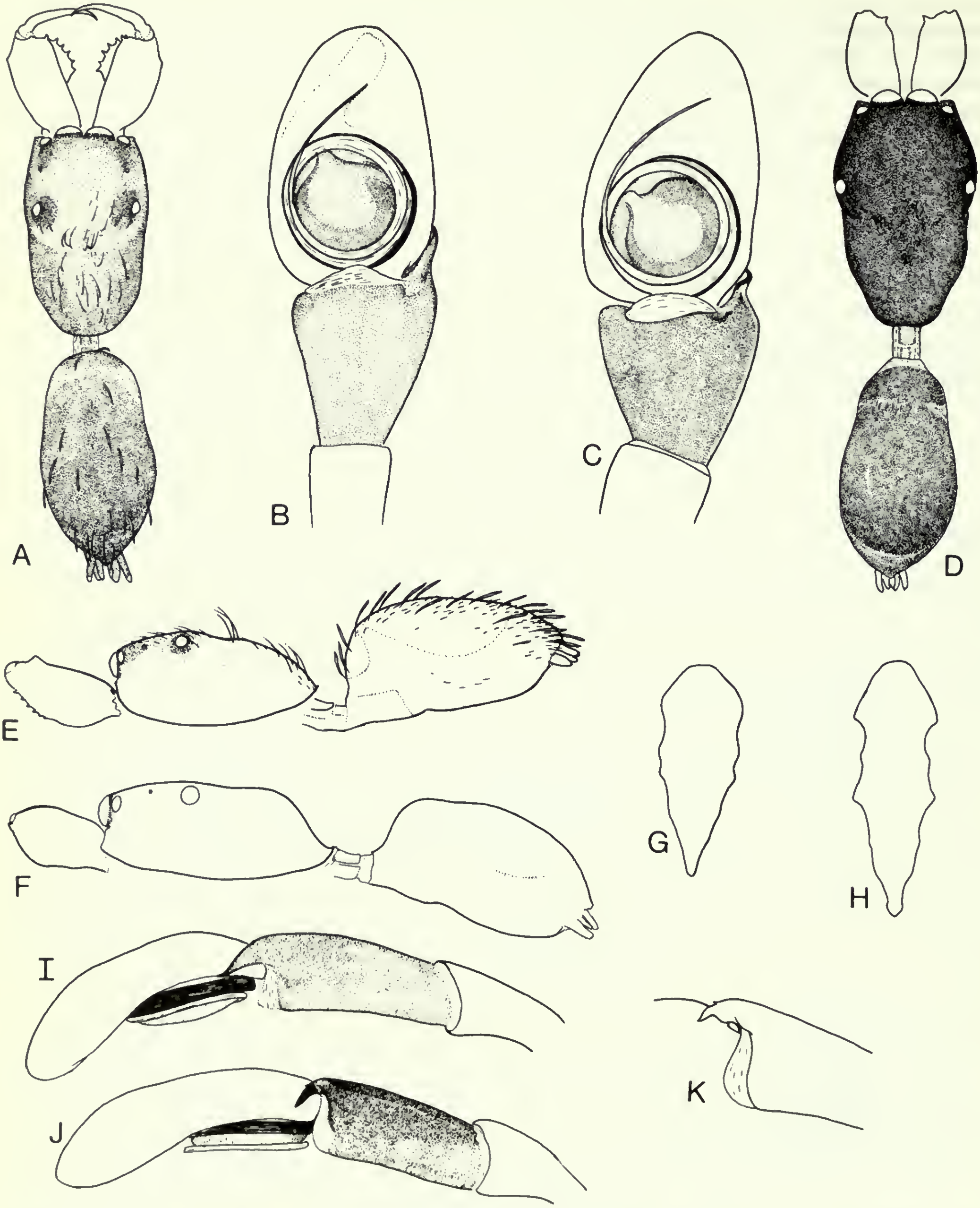

Fig. 63 (A, B, E, G, I) *Myrmarachne laurentina* Bacelar, ♂ from South Africa: (A) dorsal view; (B) palp, ventral view; (E) lateral view; (G) sternum; (I) palp, lateral view. (C, D, F, H, J, K) *Myrmarachne kilifi* sp. n. Holotype ♂: (C) palp, ventral view; (D) dorsal view; (F) lateral view; (H) sternum; (J) palp, lateral view; (K) palpal tibia showing minute dorsal spike on apophysis.

MALE. *Carapace* (Fig. 63A, E): punctured-reticulate with scattered punctures in eye region to papillate with scattered punctures on thoracic part; dark orange with short white simple hairs and long, white lanceolate ones. *Eyes*: anteriors subcontiguous with apices more or less level, fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 64B, C): rugulose with retrolateral and distal, prolateral spurs; orange-brown with black lateral keels; fang apophysis lacking. *Maxillae and Labium*: light brownish, labium darker with very slight median keel. *Sternum* (Fig. 63G) yellow-brown suffused with blackish. *Abdomen* (Fig. 63A, E): mottled brownish black with orange-brown scuta; clothed with short, simple and long, lanceolate hairs. *Legs*: legs: femora, trochanters and coxae of legs I enlarged. Legs I tarsi and metatarsi light orange-brown tinged with black; tibiae and patellae yellow-brown with blackish lateral stripes; trochanters and femora orange-brown the latter with yellowish sides distally; coxae whitish yellow. Legs II light yellow-brown to pale orange-brown tinged with grey, with greyish lateral stripes on tibiae and patellae. Legs III light orange-brown tinged with grey. Legs IV as III but trochanters whitish yellow. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2, patellae 0. *Palp* (Fig. 63B, I).

Dimensions: total length 4·64–6·8 mm, carapace length 2·16–3·24 mm. *Ratios*: AM : AL : PM : PL: 11·5 : 6 : 2 : 6, AL–PM–PL: 9–12; a: 0·88–0·91, b: 0·88–1·0, c: 0·40–0·42, d: 0·33–0·51, e: 0·87–0·97 (3♂ examined).

FEMALE (formerly undescribed). *Carapace* (Fig. 65A, B): similar to ♂; dark reddish with scattered short white hairs and long, rather stout ones. *Eyes*: anteriors subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: fringed with long light brown hairs. *Chelicerae*: rugulose; orange; promargin with 5 teeth retromargin with 7. *Maxillae and Labium*: orange-brown, labium darker with light tip. *Sternum*: pale orange with darker margins. *Abdomen* (Fig. 65A): yellow-brown mottled with black, a golden tinge posteriorly; scuta reddish orange with velvet sheen and 2 pairs of impressed dots dorsally; sparsely covered with long white hairs. *Legs*: femora slightly enlarged. Legs I tarsi and metatarsi orange tinged with black; tibiae and patellae light yellow-brown with grey lateral streaks; femora dark orange with sides and venter light yellow-brown distally; trochanters and coxae pale yellowish. Legs II tarsi and metatarsi light yellow-brown; tibiae and patellae light yellowish with greyish lateral streaks; femora and trochanters whitish yellow; coxae orange-brown. Legs III orange-brown with tarsi and metatarsi distally lighter. Legs IV orange-brown but trochanters and patellae marked with whitish. Ventral spination of legs I: as in ♂ but tibiae with 2–2–2–2 spines. *Epigyne* (Fig. 65G, H).

Dimensions: total length 6·96 mm, carapace length 2·84 mm. *Ratios*: AM : AL : PM : PL: 11 : 5 : 1 : 5·5, AL–PM–PL: 9–11; 1: 1·02, b: 1·0, c: 0·42, e: 0·87 (1♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Mozambique, South Africa.

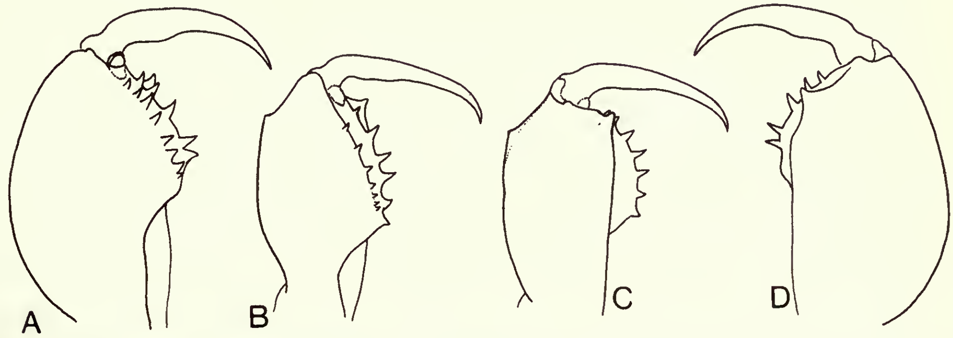

Fig. 64 (A, D) *Myrmarachne kilifi* sp. n. ♂ chelicera: (A) ventral view; (D) dorsal view. (B, C) *Myrmarachne laurentina* Bacelar ♂ chelicera: (B) ventral view; (C) dorsal view.

MATERIAL EXAMINED. Holotype ♂, data given in synonymy. SOUTH AFRICA: East London, 1♂ (*C. Martin*) (MNHN, Paris); Natal, 1♂, 1♀ (*C. Martin*) (MNHN, Paris).

REMARKS. The long, stout white hairs on this species could be useful diagnostic characters. However, their absence in other species of the *volatilis*-group needs to be confirmed as most individuals available at the present time have been rubbed to a greater or lesser degree.

Myrmarachne kilifi sp. n.

(Fig. 63C, D, F, H, J, K: 64A, D; 65D–F, I, J; Pl. 3c, d)

DIAGNOSIS. *Myrmarachne kilifi* closely resembles *M. laurentina* but can be distinguished by the presence of a dorsal spike on the tibial apophysis (Fig. 63J, K) and inverted, drop-like spermathecae (Fig. 65I, J).

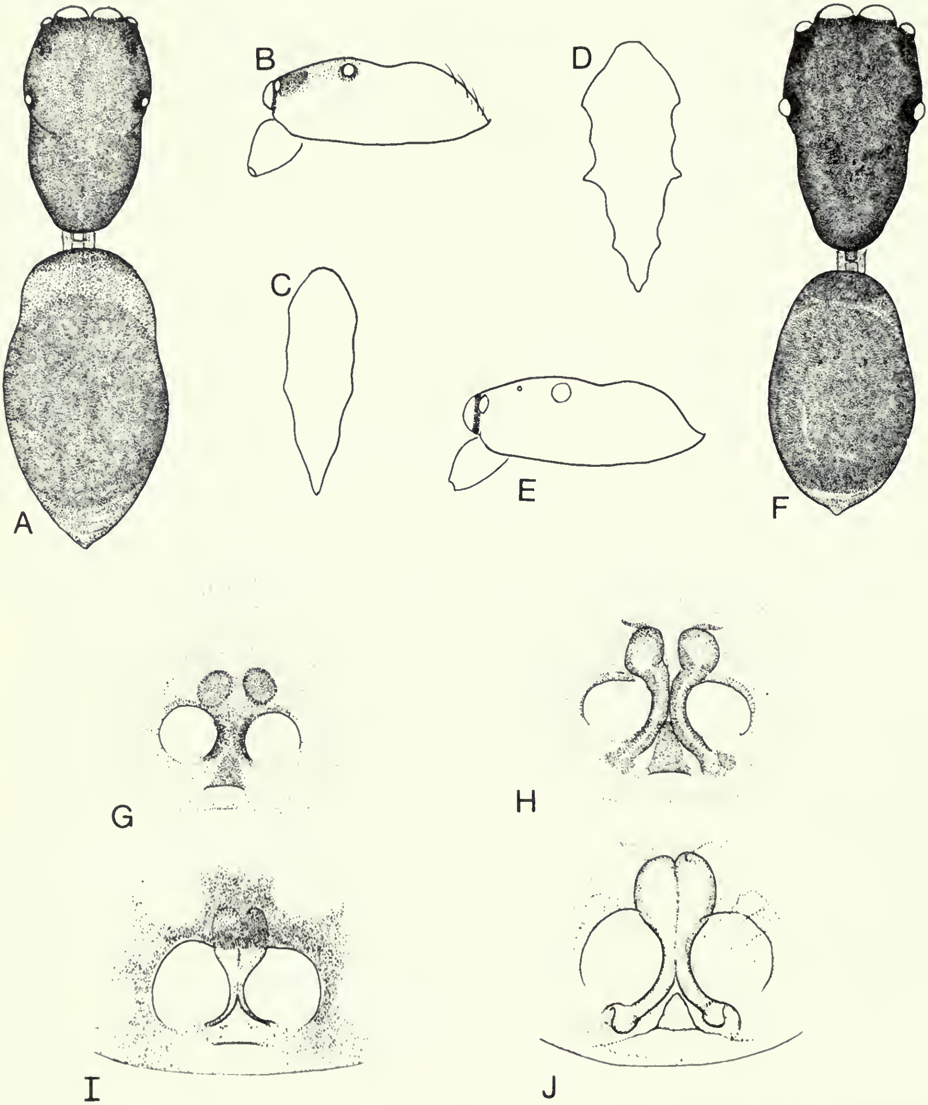

Fig. 65 (A–C, G, H) *Myrmarachne laurentina* Bacelar. ♀ from South Africa: (A) dorsal view; (B) carapace, lateral view; (C) sternum; (G) epigyne, ventral view; (H) vulva, ventral view. (D–F, I, J) *Myrmarachne kilifi* sp. n. Paratype ♀: (D) sternum; (E) carapace, lateral view; (F) dorsal view; (I) epigyne, ventral view; (J) vulva, ventral view.

MALE. *Carapace* (Fig. 63D, F): eye region punctured-reticulate with scattered punctures to longitudinally papillate between PL with thoracic part densely papillate; black with a metallic sheen, with scattered short white lanceolate hairs on thoracic 'hump' and upper part of constriction. *Eyes*: anteriors subcontiguous with apices slightly procurved, fringed with whitish hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Fig. 64A, D): rugulose with a distal, prolateral spur; brownish orange tinged with black, glossy under some lights with blackish lateral keels; fang apophysis lacking but a swelling proximally. *Maxillae*: brownish orange tinged with black. *Labium*: dark brownish with a very slight median keel. *Sternum* (Fig. 63H): light yellowish tinged with black, margins darker. *Abdomen* (Fig. 63D, F): mottled yellow-black; scuta dark brownish orange suffused with black; thinly covered with fine hairs with scattered white lanceolate hairs in constriction. *Legs*: legs I with femora, trochanters and coxae enlarged; distal segments yellow-brown with blackish lateral streaks; femora yellow-brown suffused with black; trochanters and coxae light yellowish. Legs II light yellow-brown with blackish lateral streaks on tibiae, patellae and femora; trochanters and coxae whitish yellow. Legs III light brown suffused with black, the distal segments darker. Legs IV as III but trochanters and patellae marked with whitish yellow. Ventral spination of legs I: metatarsi 2–2, tibiae 1–2–2–2–1–1–1–2, patellae 0. *Palp* (Fig. 63C, J, K).

Dimensions: total length 6·56 mm, carapace length 3·08 mm. *Ratios*: AM : AL : PM : PL: 12 : 6 : 1·5 : 7, AL–PM–PL: 10–10; a: 0·98, b: 1·0, c: 0·42, d: 0·41, e: 0·87 (1♂ examined).

FEMALE. *Carapace* (Fig. 65E, F; Pl. 3c, d): similar to ♂ but longitudinal papillae more distinct. *Eyes*: subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: as in ♂. *Chelicerae*: rugulose; brownish orange with inner distal margins lighter; promargin with 3 teeth, retromargin with 6. *Maxillae and Labium*: similar to ♂ but keel entirely lacking. *Sternum* (Fig. 65D). *Abdomen* (Fig. 65F): mottled yellow-black; scuta dark brownish orange suffused with black; thinly clothed with fine hairs with white lanceolate hairs in constriction. *Legs*: as in ♂ but enlargement of legs I less marked. Ventral spination of legs I as in ♂ but tibiae 2–2–2–1–2. *Epigyne* (Fig. 65I, J).

Dimensions: total length 4·44–5·2 mm, carapace length 2·2–2·4 mm. *Ratios*: AM : AL : PM : PL: 10 : 5·5 : 1 : 3·6, AL–PM–PL: 8–7·5; a: 1·03, b: 1·05–1·08, c: 0·43–0·44, e: 0·76 (2♀ examined).

One of the two paratype females has the abdominal scuta contiguous and poorly defined and its presence is probably of no value as a diagnostic character.

BIOLOGY. Unknown.

DISTRIBUTION. Kenya.

MATERIAL EXAMINED. Holotype ♂, KENYA, Kilifi, swept from low bushes and shrubs in a hot, dry sandy garden, 11.viii.1974 (*J. & F. Murphy*, vial 4048) (BMNH, reg. no. 1975.11.25.9). Paratypes. 2♀, same data as holotype.

ETYMOLOGY. The specific name is a noun in apposition taken from the type-locality.

Myrmarachne andrewi sp. n.

(Figs 66B–E, G, H, J; 67A, D, E)

DIAGNOSIS. *M. andrewi* is a distinctive species readily distinguished from other members of the *volatilis*-group by the form of the body (Fig. 66B, G).

MALE. *Carapace* (Fig. 66B, G): punctured-reticulate; brown-black. *Eyes*: anteriors contiguous with apices procurved, fringed with whitish hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Fig. 66D, H, J): almost vertical; rugulose with small retrolateral and distal, prolateral spurs; glistening dark brown with black lateral keels; fang with 2 apophysises (in ventral view). *Maxillae and Labium*: yellow-brown, labium darker. *Sternum* (Fig. 66E): yellow-brown with blackish mottling. *Abdomen* (Fig. 66B, G): grey yellow mottled with blackish; dorsal scuta dark orange-brown; ventral scutum orange-brown; sparsely white haired. *Legs*: legs I with femora, trochanters and coxae enlarged; yellow-brown with brown-black femora. Legs II and III yellow-brown.

Legs IV yellow-brown with femora, trochanters and coxae darker. Ventral spination of legs I; metatarsi 2–2, tibiae 2–2–2–2 or 2–2–2–2–1, patellae 0. *Palp* (Fig. 67A, D).

Dimensions: total length 4·34–4·96 mm, carapace length 1·84–2·04 mm. *Ratios*: AM : AL : PM : PL: 7 : 4 : 1 : 4, AL–PM–PL: 6·5–4·6; a: 1·02, b: 1·02, c: 0·40–0·41, d: 0·23–0·29, e: 0·64–0·65 (2♂ examined).

Female. *Carapace* (Fig. 66C): brown-black with a metallic sheen. *Eyes*: as in ♂. *Clypeus*: as in ♂. *Chelicerae*: orange-brown, mottled with blackish; teeth not examined. *Maxillae and Labium*: brown-black with inner distal margin of maxillae and labial tip yellow-brown. *Sternum*: elongate;

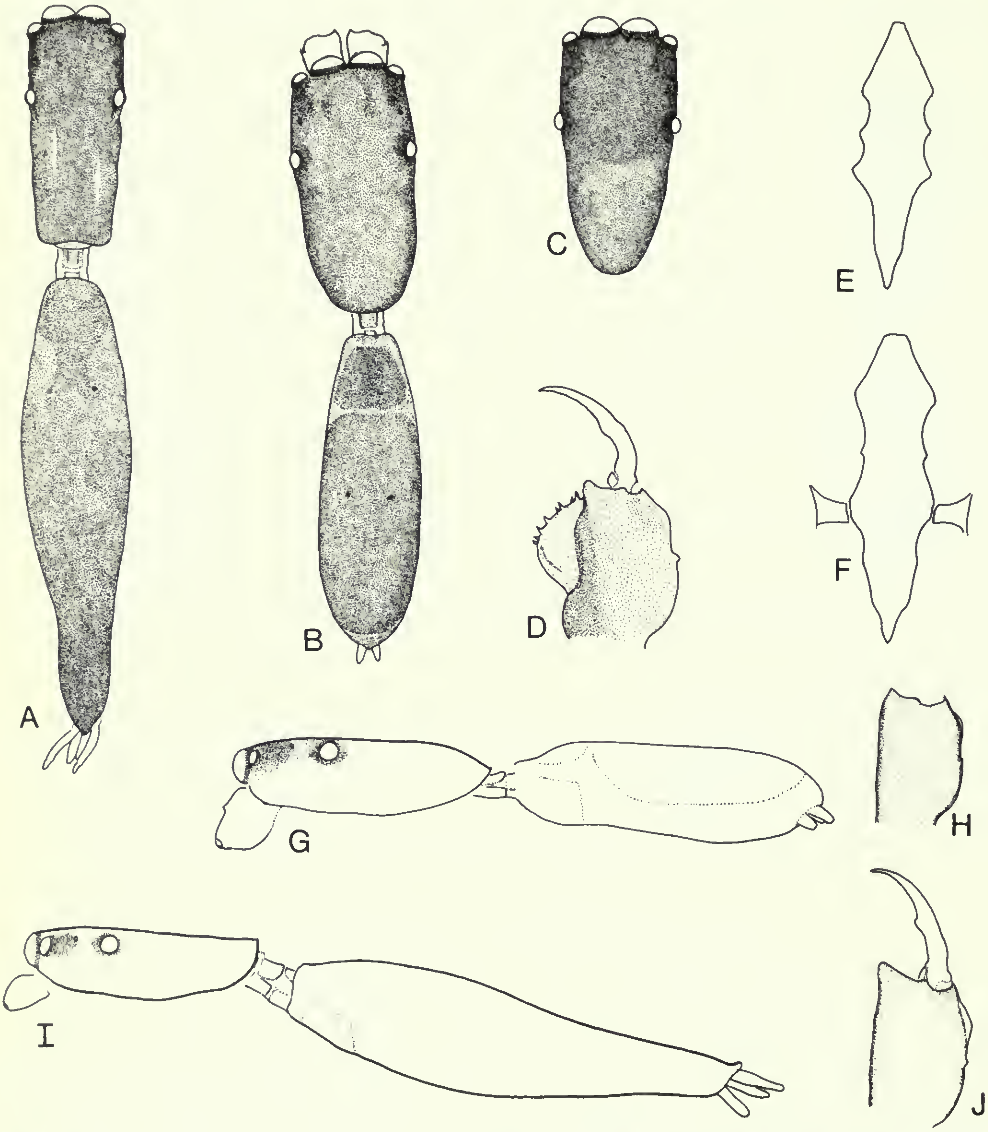

Fig. 66 (A, F, I) *Myrmarachne longiventris* (Simon). Neotype ♀: (A) dorsal view; (F) sternum; (I) lateral view. (B–E, G, H, J) *Myrmarachne andrewi* sp. n. Holotype ♂: (B) dorsal view; (E) sternum; (G) lateral view; (H) chelicera, dorsal view. ♂ from Angola: (D) chelicera, dorsal view but slightly to one side, to show distal lobe; (J) chelicera, dorsal view. Paratype ♀: (C) carapace, dorsal view.

mottled brownish black. *Abdomen*: similar to male; yellow-brown mottled with black; scuta lacking. *Legs*: light yellow-brown with coxae, trochanters and proximal part of femora IV blackish; also a black streak in side of femora I. Ventral spination of legs I: as in ♂ but tibiae with 2–2–2–2–1 spines. *Epigyne* (Fig. 67E): internal structures not examined.

Dimensions: total length 4·5 mm, carapace length 1·76 mm. *Ratios*: AM : AL : PM : PL: 7 : 4 : 1 : 4, AL–PM–PL: 6–4·5; a: 1·05, b: 1·11, c: 0·40, e: 0·62 (1♀ examined).

A larger male from Angola has an orange carapace and abdomen; the cheliceral spurs are more pronounced (Fig. 66D).

BIOLOGY. Unknown.

DISTRIBUTION. Angola, Zaire.

MATERIAL EXAMINED. Holotype ♂, ZAIRE, Mwenga Territory, Post Kitutu, Elila Valley, secondary forest, 650 m, 6.iv.1958 (*N. Leleup*, MT 142456) (MRAC, Tervuren). Paratypes. ANGOLA: Dundo, Chitato River, route frontiere Dundo, with sweep net, 1♂, 26.ix.1946 (*A. B. Machado*, Ang. 46.8) (BMNH). ZAIRE: Kinshasa, 1♀, 1.iv.1971 (*A. Bouillon*, MT 142456) (MRAC, Tervuren).

ETYMOLOGY. This species is named after my son Andrew Wanless.

Myrmarachne longiventris (Simon) comb. n.

(Figs 66A, F, I; 67B, C)

Bizone longiventris Simon, 1903 : 1050, ♀. Holotype ♀, Madagascar, Sakavalana (MNHN, Paris) [not examined, ? lost].

Bizonella longiventris: Strand, 1929 : 15. Roewer, 1954 : 939. Bonnet, 1955 : 887. Roewer, 1965 : 80, fig. 71. Prószyński, 1971b : 385.

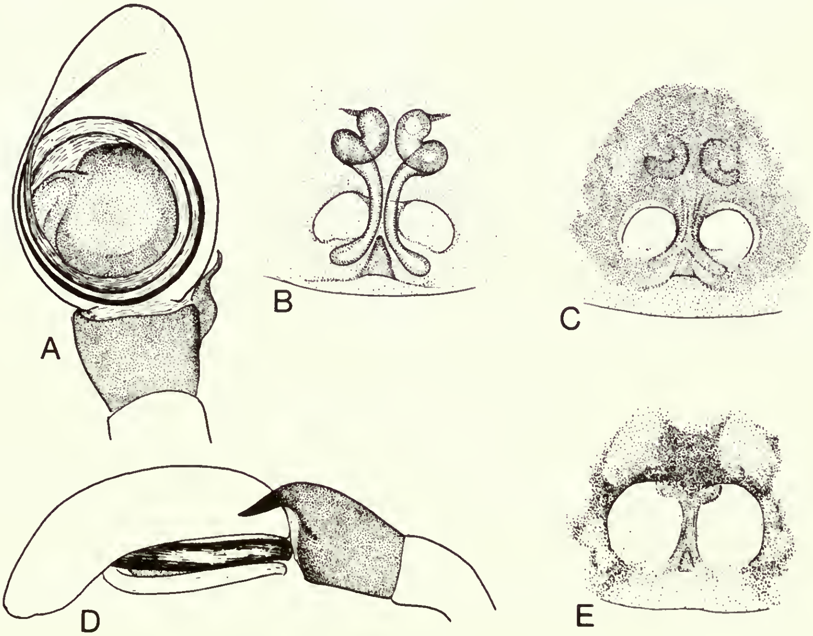

Fig. 67 (A, D, E) *Myrmarachne andrewi* sp. n. Holotype ♂: (A) palp, ventral view; (D) palp, lateral view. Paratype ♀: (E) epigyne, ventral view. (B, C) *Myrmarachne longiventris* (Simon). Neotype ♀: (B) vulva, ventral view; (C) epigyne, ventral view.

Roewer (1965) described and figured the holotype female of this species which has been subsequently lost. The only example of *longiventris* in the Simon collection, Paris, is an immature female labelled '22230 *Bizone longiventris* E. S. Madagascar'. This specimen is identical to immatures collected with an adult female that is described below and here formally designated neotype.

Diagnosis. *M. longiventris* is a very distinctive species. The female is readily separated from other female *Myrmarachne* in the Ethiopian region by the form of the carapace which lacks a thoracic slope (Fig. 66I). The epigyne (Fig. 67C, B) is characteristic of the *volatilis*-group but in the absence of the male any conclusions on the affinities of this species must be regarded as tentative.

Male. Unknown.

Female. *Carapace* (Fig. 66A, I): finely rugulose to punctate; dark mahogany, glossy. *Eyes*: contiguous with apices procurved, sparsely fringed with light brown hairs. *Clypeus*: sparsely brown haired. *Chelicerae*: light brown with blackish markings; promargin with 3 teeth, retromargin with 5. *Maxillae and Labium*: brown with inner distal margins of maxillae and labial tip yellow-brown. *Sternum* (Fig. 66F): orange-brown, glossy under some lights, with scattered light brown hairs. *Abdomen* (Fig. 66A, I): yellow-brown suffused with black glossy under some lights, with scattered light brown hairs. *Legs*: yellow-brown but metatarsi I suffused with black and coxae III–IV marked with black. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2; patellae 0. *Palp*: dark brown. *Epigyne* (Fig. 67B, C).

Dimensions: total length 6·4 mm, carapace length 2·0 mm. *Ratios*: AM : AL : PM : PL: 8 : 4 : 1 : 4, AL–PM–PL: 5–6; a: 1·08, b: 1·06, c: 0·40, e: 0·62 (1 ♀ examined).

Biology. Unknown.

Distribution. Madagascar.

Material examined. Neotype ♀, Madagascar, Massif Andringitra, Mahasoa, 2100 m, x.1971 (*B. Ranson*, MT 142843). Madagascar: immature ♀ (MNHN, Paris).

Remarks. Female *longiventris* closely resembles female *M. peckhami* Roewer and they may be isopatric as both species have been found in the same vial.

The *lesserti*-group

This small group is only known from two closely related species, *M. lesserti* Lawrence and *M. albosetosa* sp. n., both from South Africa. Females are unknown but males may be easily distinguished from other male Ethiopian *Myrmarachne* by the unusually long and sinuous tibial apophysis which has a flange arising from the ventral margin (Fig. 69B, C) and a well-developed protuberance on the proximal ectal margin of the cymbium, which appears to protect the apophysis.

The affinities are uncertain but gross morphology resembles that of the *electrica*-group, *M. augusta* (Peckham & Peckham) and *M. diegoensis* sp. n.

Myrmarachne lesserti Lawrence

(Figs 68A, C, D, F; 69A, B, E–G)

Myrmarachne lesserti Lawrence, 1938 : 521, fig. 39, ♂. Holotype ♂, South Africa, Durban, The Bluff (NM, Pietermaritzburg) [Examined]. Roewer, 1954 : 943. Bonnet, 1957 : 3008. Roewer, 1965 : 69, fig. 31. Prószyński, 1971b : 439.

Diagnosis. *M. lesserti* is a variable species, closely related to *M. albosetosa* sp. n. but can be readily distinguished by the retrolateral spurs on the chelicerae (Fig. 69E, G) and the rectangular palpal tibiae (Fig. 69B).

Female. Unknown.

Male. *Carapace* (Fig. 68A, F): punctured-reticulate; orange to reddish with scattered white hairs. *Eyes*: anteriors subcontiguous with apices procurved, sparsely fringed with white hairs. *Clypeus*: sparsely fringed with long fine hairs. *Chelicerae* (Fig. 69E–G): finely rugulose with furrows; with distal, prolateral and retrolateral spurs; light orange, shiny, with blackish lateral keels; fang apophysis and retrolateral teeth lacking. *Maxillae*: yellowish. *Labium*: yellowish to orange-brown. *Sternum* (Fig. 68D): light orange with darker margins. *Abdomen* (Fig. 68A, F): light yellowish orange with blackish mottling; scuta dark orange with 2 pairs of impressed dots dorsally. *Legs*: legs I (Fig. 68C) the heaviest with femora, trochanters and coxae enlarged; tarsi whitish; metatarsi, tibiae and patellae light yellow; other segments pale orange. Legs II whitish with proximal segments light orange. Legs III–IV light yellowish, a whitish mark on patellae IV. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2–2–2 or 2–2–2–2–2, patellae 1 or 0. *Palp* (Fig. 69A, B).

Dimensions: total length 4·96–7·0 mm, carapace length 2·24–3·48 mm. *Ratios*: AM : AL : PM : PL: 14 : 7 : 2 : 7, AL–PM–PL: 8–7; a: 0·95–1·02, b: 0·98–1·0, c: 0·42–0·44, d: 0·42–0·44, e: 0·83–0·96 (4♂, examined).

BIOLOGY. Unknown.

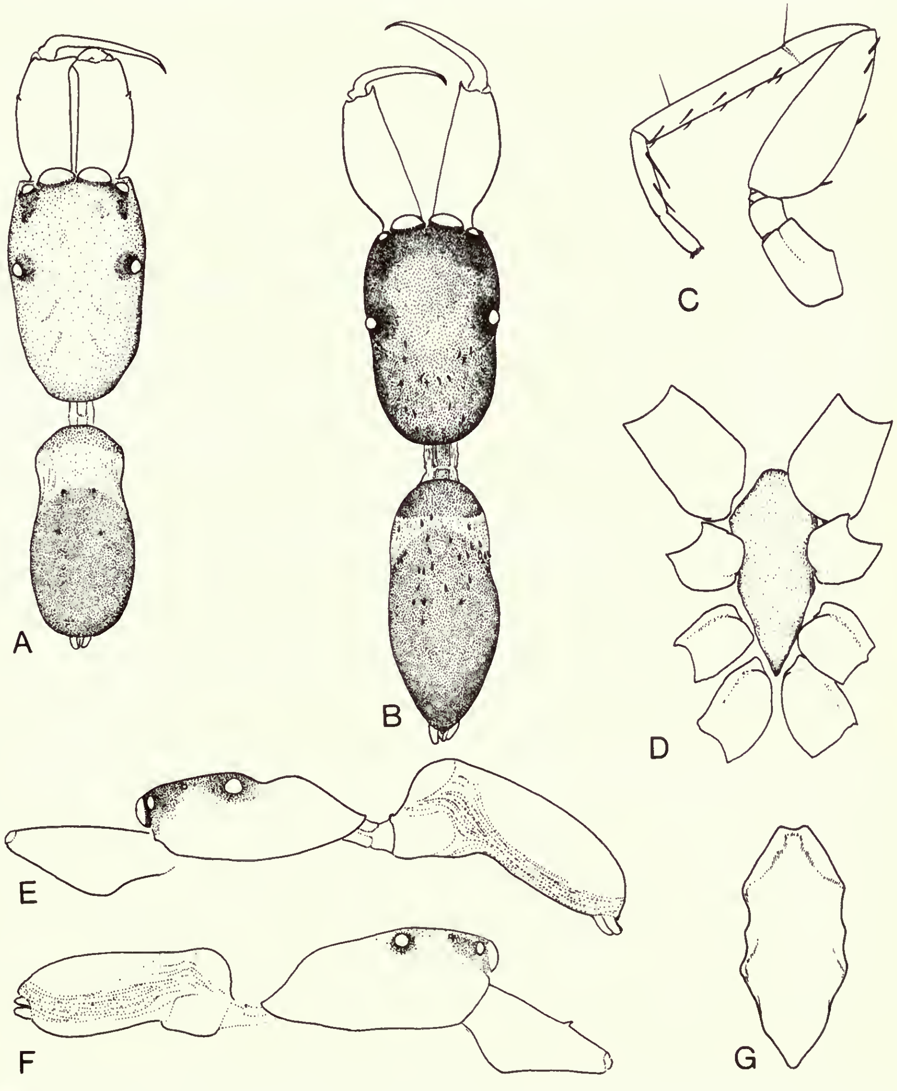

Fig. 68 (A, C, D, F) *Myrmarachne lesserti* Lawrence. ♂ from South Africa: (A) dorsal view; (C) leg I; (D) sternum; (F) lateral view. (B, E, G) *Myrmarachne albosetosa* sp. n. Holotype ♂: (B) dorsal view; (E) lateral view; (G) sternum.

Distribution. South Africa.

Material examined. Holotype ♂, data given in synonymy. South Africa: Natal, Alfred District, Oribi Gorge, in litter, 1♂, xi.1961 (*N. Leleup*, MT 132317) (MRAC, Tervuren). Natal, 1♂ (*C. Martin*), Zululand, 1♂ (*C. Martin*) (MNHN, Paris).

Myrmarachne albosetosa sp. n.

(Figs 68B, E, G; 69C, D, H–J)

The Peckhams labelled the holotype of this species *Myrmarachne solitarius* Peckham. The original label gives South African Museum as the locality but with Museum carefully crossed out. The specimen probably came from Cape Town but there is some doubt (Dr H. W. Levi, pers. comm.).

Diagnosis. *M. albosetosa* is closely related to *M. lesserti* Lawrence but may be distinguished by the lack of retrolateral spurs on the chelicerae (Fig. 69I, J) and the somewhat bulbous palpal tibiae (Fig. 69C).

Female. Unknown.

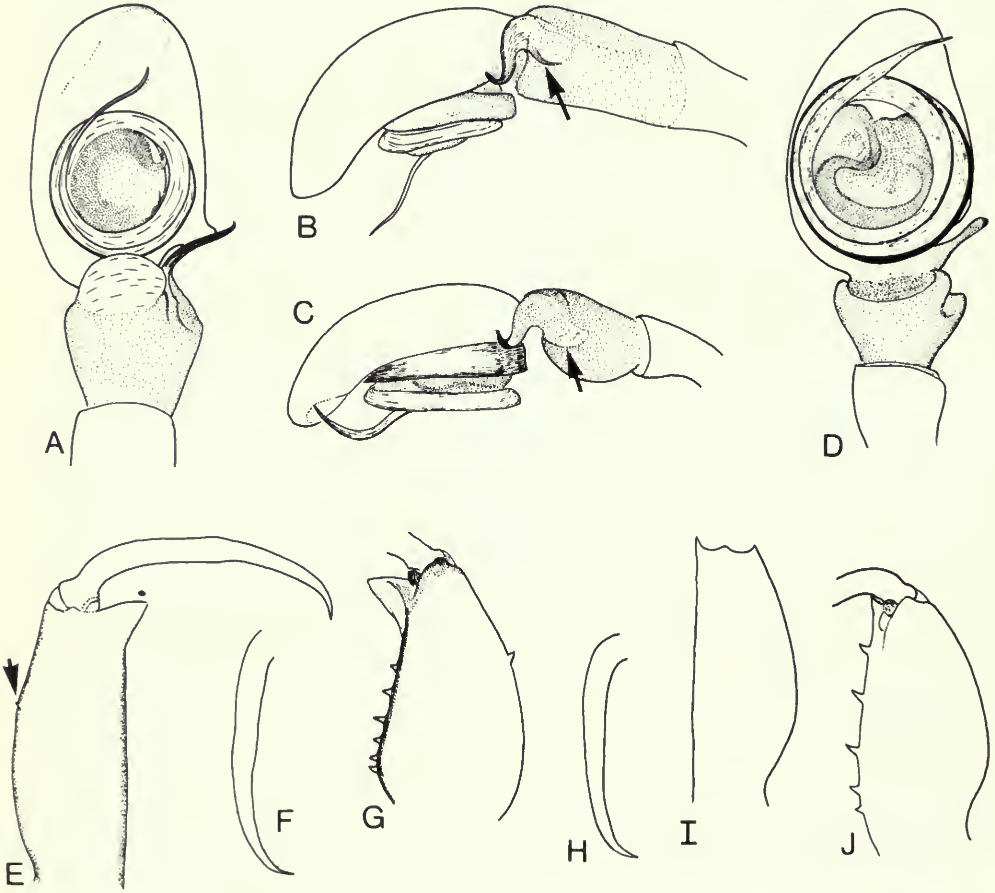

Fig. 69 (A, B, E–G) *Myrmarachne lesserti* Lawrence. ♂ from South Africa: (A) palp, ventral view; (B) palp, lateral view; (E) chelicera, dorsal view; (F) fang; (G) chelicera, ventral view. (C, D, H–J) *Myrmarachne albosetosa* sp. n. Holotype ♂: (C) palp, lateral view; (D) palp, ventral view; (H) fang; (I) chelicera, dorsal view; (J) chelicera, ventral view.

MALE. *Carapace* (Fig. 68B, E): punctured-reticulate; reddish brown with scattered white lanceolate hairs. *Eyes*: anteriors subcontiguous with apices more or less level, fringed with white hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Fig. 69H–J): horizontal but dorsal surface with an inward slope; rugulose with small, distal, prolateral spurs; brownish orange, shiny with blackish lateral keels; fang apophysis lacking; fang groove with promarginal teeth and minute retromarginal denticles. *Maxillae*: yellow-brown tinged with some black. *Labium*: orange-brown. *Sternum* (Fig. 68G): orange-brown with darker margins. *Abdomen* (Fig. 68B, E): yellow-brown with blackish mottling; scuta orange-brown, shiny under some lights; sparsely covered with white lanceolate hairs. *Legs*: femora I slightly enlarged. Legs I–II with tarsi light yellow-brown; metatarsi, tibiae and patellae yellow-brown with darker sides; femora dark brown with distal yellowish patch; trochanters brown; coxae yellow with brown sides. Legs III brown grading to light brown distally. Legs IV as III but trochanters and venter of coxae yellow. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2, patellae 0. *Palp* (Fig. 69C, D).

Dimensions: total length 4·0 mm, carapace length 1·68 mm. *Ratios*: AM : AL : PM : PL: 6 : 3·5 : 1 : 3·5, AL–PM–PL: 5·5–7·5; a: 0·98, b: 1·02, c: 0·45, d: 0·54, e: 0·86 (1♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. South Africa.

MATERIAL EXAMINED. Holotype ♂, South Africa, ? Cape Town (MCZ, Harvard).

ETYMOLOGY. The specific name refers to the scattered white setae on the body.

Species Sola

Myrmarachne augusta (Peckham & Peckham)

(Fig. 70A–H)

Salticus augustus Peckham & Peckham, 1892 : 24, pl. 1, fig. 5, ♂. LECTOTYPE ♂ (here designated), Madagascar (MCZ, Harvard) [Examined].

Myrmarachne angustiformis Simon, 1901 : 503. Nom. nov pro *augusta* Peckham & Peckham, non *angusta* Thorell. [Unjustified emendation.]

Myrmarachne augusta: Roewer, 1954 : 942. Bonnet, 1957 : 2999. Roewer, 1965 : 63. Prószyński, 1971b : 436.

The Peckhams described and figured a variety of this species. The specimen, a male with long chelicerae, represents another species that is described elsewhere in this present paper (*M. cowanii*, p. 73).

DIAGNOSIS. *M. augusta* is a distinctive species of uncertain affinities, readily distinguished from all other male, Ethiopian *Myrmarachne* by the form of the chelicerae (Fig. 70C, H) and structure of the palp (Fig. 70B, F).

FEMALE. Unknown.

MALE. *Carapace* (Fig. 70A, E): punctured-reticulate; dark reddish orange, shiny with scattered, very fine brownish hairs. *Eyes*: subcontiguous with apices procurved, fringed with whitish hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 70C, H): rugulose with furrows, with paired, distal, prolateral spurs; reddish orange, shiny, with blackish lateral keels; fang apophysis and retromarginal teeth lacking. *Maxillae and Labium*: orange-brown, labium darker. *Sternum* (Fig. 70G): orange, shiny. *Abdomen* (Fig. 70A, E): brownish orange mottled with blackish; scuta reddish orange tinged with black, glossy. *Legs*: legs I femora, trochanters and coxae slightly enlarged; orange-brown but coxae, and tibiae distally light yellowish. Other legs generally orange-brown but with light yellowish on trochanters IV and patellae IV. Ventral spination of legs I: metatarsi 2–2; tibiae 2–2–2–2, patellae 0. *Palp* (Fig. 70B, F): the secondary tibial apophysis is not very conspicuous.

Dimensions: total length 4·2–6·9 mm, carapace length 1·9–3·3 mm, *Ratios*: AM : AL : PM : PL: 8 : 4 : 1 : 4·3, AL–PM–PL: 6–7; a: 0·9–0·96, b: 0·93–1·0, c: 0·39–0·42, d: 0·67–0·94, e: 0·72–0·88 (3♂ examined).

A large ♂ from Antongil Bay has unusually broad chelicerae (Fig. 70H) with a minute retrolateral spur.

Biology. Unknown.

Distribution. Madagascar.

Material examined. Lectotype ♂, data given in synonymy. MADAGASCAR: Antongil Bay, 2♂ (*A. Mocqueries*) (MNHN, Paris).

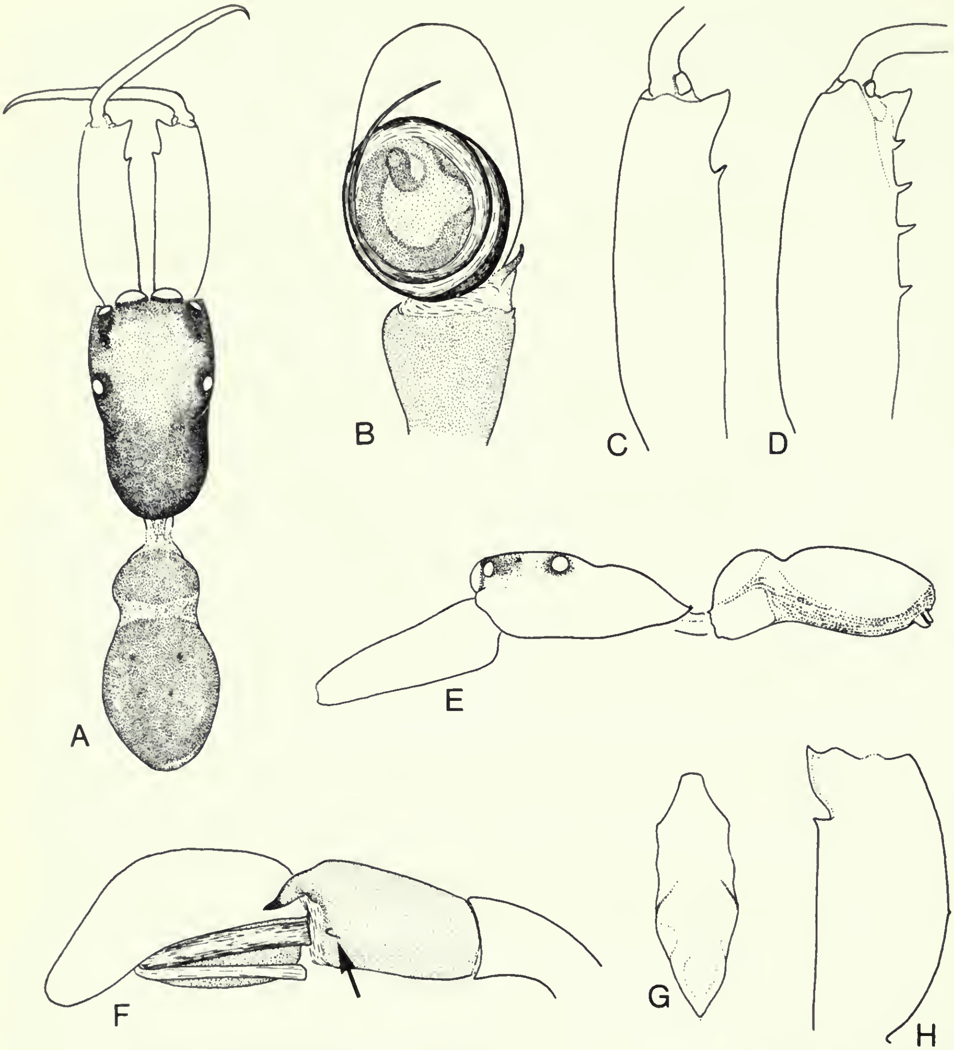

Fig. 70 *Myrmarachne augusta* (Peckham & Peckham). ♂: (A) dorsal view; (B) palp, ventral view; (C) chelicera, dorsal view; (D) chelicera ventral view; (E) lateral view; (F) palp, lateral view; (G) sternum. ♂ from Antongil, (H) chelicera, dorsal view.

The *nubilis*-group

This group is known only from females and comprises two species, *M. nubilis* sp. n. and *M. mahasoa* sp. n., both from Madagascar. They are distinguished from other female Ethiopian *Myrmarachne* by the median subtriangular pouch; unusually complex spermathecae and vague distal seminal ducts (Fig. 72A–F).

The affinities are uncertain but it is possible that *M. nubilis* may belong with *M. augusta* (Peckham & Peckham), a species already described as having uncertain affinities and treated as species sola.

Myrmarachne nubilis sp. n.

(Figs 71A–C; 72A–C)

DIAGNOSIS. *M. nubilis* most closely resembles *M. mahasoa* sp. n. but can be distinguished by the lack of a thoracic 'hump' (Fig. 71B) and the form of the spermathecae (Fig. 72A–C).

MALE. Unknown but this species has been found (in vials) with males of *M. augusta* (Peckham & Peckham) and *M. simplexella* (Peckham & Peckham). The relationship is uncertain but female genitalia indicate that *nubilis* is more likely to belong with *augusta*.

FEMALE. *Carapace* (Fig. 71A, B): punctured-reticulate in eye region with poorly defined ripples between PL to densely papillate on thoracic part; dark reddish with scattered, long, fine white hairs on thorax. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: sparsely white haired. *Chelicerae*: rugulose; brownish orange, shiny; promargin with 5 teeth, retromargin with 9. *Maxillae and Labium*: brownish orange with inner margins of maxillae and labial tip paler. Sternum (Fig. 71C): light yellow brown. *Abdomen* (Fig. 71A): yellow-brown suffused and mottled with blackish. *Legs*: legs I yellowish with metatarsi and sides of tibiae, patellae and femora brownish black. Legs II as I but markings lighter, the femora yellowish with an elongate black spot on inner surface. Legs III brownish orange with yellowish marks on patellae and tibiae. Legs IV as III but coxae and trochanters yellowish, the latter with a brown external stripe. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 1. *Epigyne* (Fig. 72A–C).

Dimensions: total length 4·64–4·88 mm, carapace length 2·12–2·32 mm. *Ratios*: AM : AL : PM : PL: 9·5 : 5 : 1·3 : 6, AL–PM–PL: 6–5, a: 1·03, b: 1·08–1·09, c: 0·40–0·43, e: 0·69–0·70 (2♀ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Madagascar.

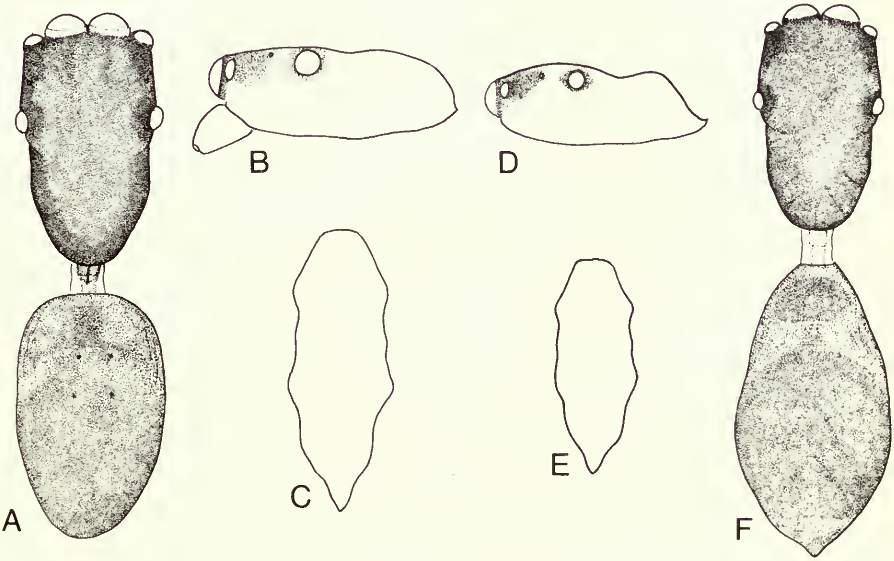

Fig. 71 (A–C) *Myrmarachne nubilis* sp. n. Holotype ♀: (A) dorsal view; (B) carapace, lateral view; (C) sternum. (D–F) *Myrmarachne mahasoa* sp. n. Holotype ♀: (D) carapace, lateral view; (E) sternum; (F) dorsal view.

MATERIAL EXAMINED. Holotype ♀, MADAGASCAR, Antongil Bay (*A. Mocqueries*, MNHN 7433) (MNHN, Paris). Paratype. MADAGASCAR: Antongil Bay (*A. Mocqueries*, MNHN 20212) (MNHN, Paris).

ETYMOLOGY. The specific name is a latin adjective meaning marriageable.

Myrmarachne mahasoa sp. n.

(Figs 71D–F; 72D–F)

DIAGNOSIS. *M. mahasoa* most closely resembles *M. nubilis* sp. n. but can be distinguished by the thoracic 'hump' (Fig. 71D) and the form of the spermathecae (Fig. 72D).

MALE. Unknown.

FEMALE. *Carapace* (Fig. 71D, F): finely punctured-reticulate; orange-brown with sooty marks on thoracic part, shiny. *Eyes*: contiguous with apices procurved, fringed with white hairs. *Clypeus*: sparsely white haired. *Chelicerae*: rugulose; orange-brown, shiny, with 5 teeth on both margins. *Maxillae and Labium*: orange-brown tinged with black with inner margin of maxillae and labial tip paler. *Sternum* (Fig. 71E): yellow-brown with darker margins, shiny. *Abdomen* (Fig. 71F): yellow-brown mottled with black; scuta light brown tinged with black with vague chevrons, shiny. *Legs*: legs I tarsi whitish yellow; metatarsi orange-brown; tibiae and patellae light yellow-brown with brownish lateral streaks; femora orange-brown with sides and venter whitish yellow distally; trochanters orange-brown; coxae whitish yellow. Legs II as I but femora and trochanters whitish yellow, the former with an orange-brown stripe inside. Legs III tarsi light yellow-brown; tibiae yellow-brown with orange-brown sides; remaining segments orange-brown. Legs IV tarsi yellow-brown; coxae and trochanters whitish yellow; remaining segments orange-brown but with whitish marks on patellae. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2, patellae 1. *Epigyne* (Fig. 72D–F).

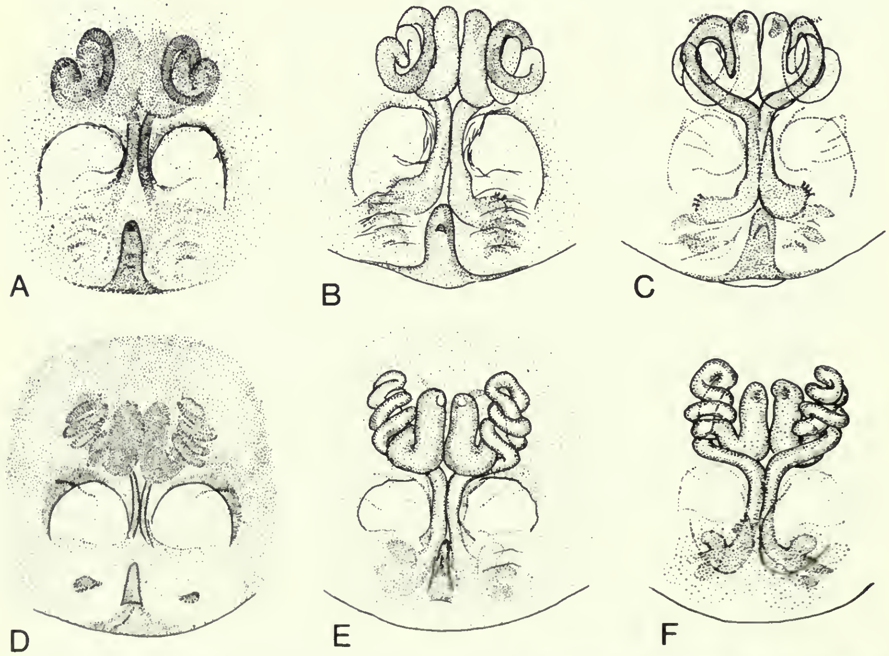

Fig. 72 (A–C) *Myrmarachne nubilis* sp. n. Holotype ♀: (A) epigyne, ventral view; (B) vulva, ventral view; (C) vulva, dorsal view. (D–F) *Myrmarachne mahasoa* sp. n. Holotype ♀: (D) epigyne, ventral view; (E) vulva, ventral view; (F) vulva, dorsal view.

Dimensions: total length 4·04 mm, carapace length 1·62 mm. *Ratios*: AM : AL : PM : PL: 7 : 3·5 : 1 : 4, AL–PM–PL: 5·5–5; a: 1·04, b: 1·08, c: 0·45, e: 0·74 (1 ♀ examined).

Biology. Unknown.

Distribution. Madagascar.

Material examined. Holotype ♀, Madagascar, Massif Andringitra, Mahasoa, 2100 m, x.1971 (*B. Ranson*, MT 142876) (MRAC, Tervuren).

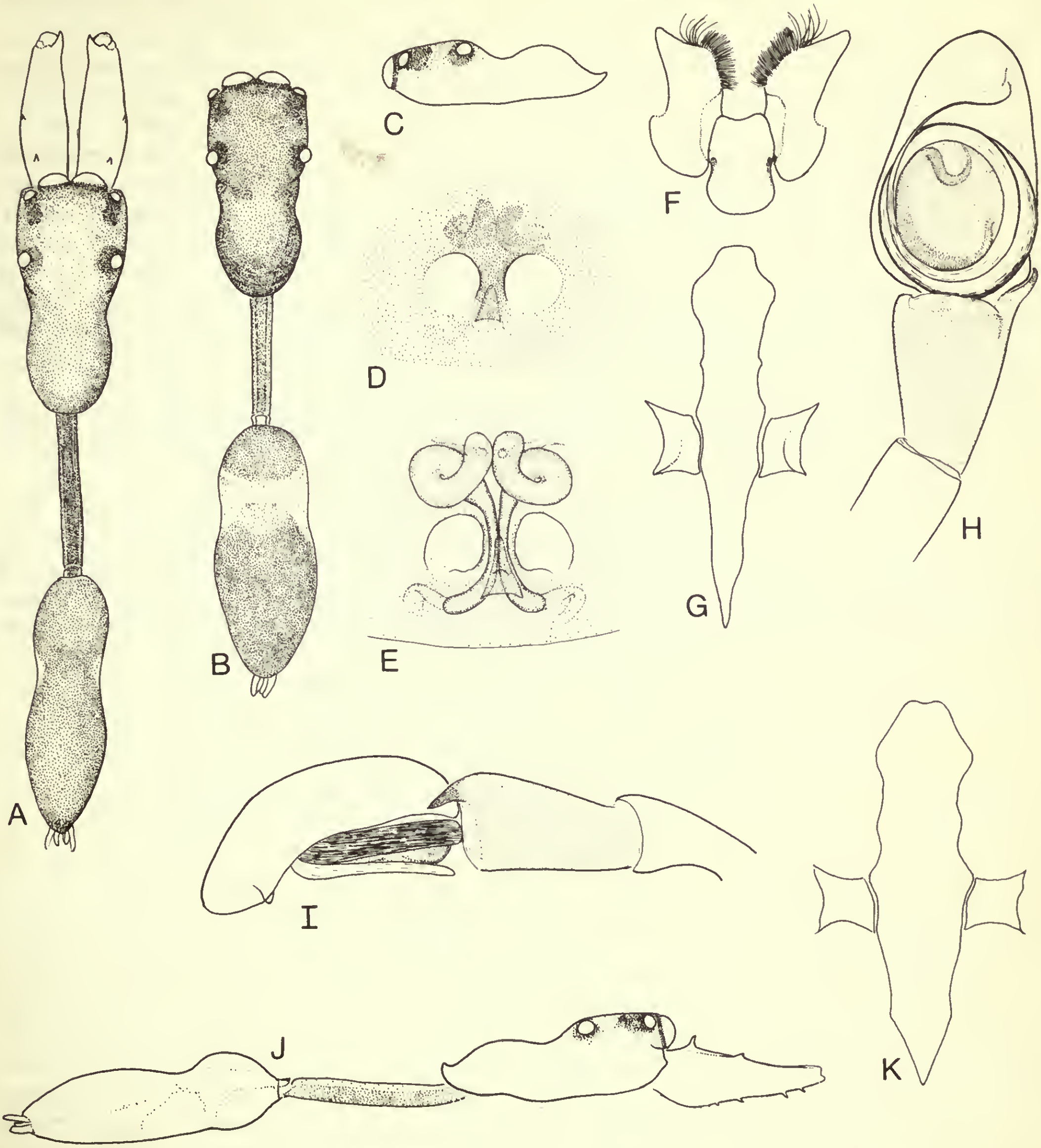

Fig. 73 *Myrmarachne eumenes* (Simon). ♂ from Antongil: (A) dorsal view; (F) maxillae and labium; (G) sternum; (H) palp, ventral view; (I) palp, lateral view; (J) lateral view; (K) sternum of another Antongil ♂. ♀ from Est Antsirabe: (B) dorsal view; (C) carapace, lateral view; (D) epigyne, ventral view; (E) vulva ventral view.

Species Sola

Myrmarachne eumenes (Simon)

(Figs 73A–K; 74A–E; Pl. 2b)

Salticus eumenes Simon, 1900 : 405, ♂. LECTOTYPE ♂ (here designated), Madagascar, Nossi-Be (MNHN, Paris) [Examined].

Myrmarachne eumenes (Simon): Simon, 1901 : 499, figs 587–589. Roewer, 1954 : 942. Bonnet, 1957 : 3002. Roewer, 1965 : 66, fig. 29. Prószyński, 1971b : 437.

Diagnosis. The exceedingly long pedicel is diagnostic for *M. eumenes*. It is a species of uncertain affinities but the relatively short, filamentous tip of the embolus (Fig. 73H, I) and looped distal sperm ducts of the epigyne (Fig. 73E) suggest that *eumenes* is related to the *electrica*-group.

Male. *Carapace* (Fig. 73A, J; Pl. 2b): finely reticulate in eye region to smooth with irregular punctures on thoracic part with transverse furrows posteriorly; dark reddish, shiny, with light orange guanin in eye region. *Eyes*: anteriors subcontiguous with apices slightly procurved, fringed with whitish hairs. *Clypeus*: sparsely brown haired. *Chelicerae* (Fig. 74A–E): rugulose with furrows with distal prolateral, retrolateral and proximal median spurs; orange, shiny with blackish lateral keels; fang apophysis lacking. *Maxillae and Labium* (Fig. 73F): yellowish orange, with outer distal margin of maxillae drawn to a point. *Sternum* (Fig. 73G): yellowish orange. *Pedicel*: exceedingly long (ratio of anterior to posterior segments about 10 : 1). *Abdomen* (Fig. 73A, J): light orange brown mottled with grey, the venter and lower sides of constriction yellowish; scuta ill-defined, orange-brown tinged with grey, shiny. *Legs*: yellowish orange to orange with metatarsi I blackish. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2 or 2–2–2–2, patellae 1. *Palp* (Fig. 73H, I).

Dimensions: total length 5·6–8·7 mm, carapace length 2·5–3·2 mm. *Ratios*: AM : AL : PM : PL: 10 : 5 : 1 : 5·5, AL–PM–PL: 6·5–7; a: 0·92–1·0, b: 0·98–1·02, c: 0·37–0·38, d: 0·50–0·74, e: 0·78–0·92; pedicel length to carapace length 0·30–0·74 (10♂ examined).

Female (formerly undescribed). *Carapace* (Fig. 73B, C): more or less as in ♂, orange to dark reddish, shiny. *Eyes*: as in ♂. *Clypeus*: as in ♂. *Chelicerae*: rugulose; light orange; promargin with 4–6 teeth retromargin with 6 or 7. *Maxillae and Labium*: typical of genus; brownish orange with inner margins of maxillae and labial tip lighter. *Sternum*: orange with darker margins. *Abdomen* (Fig. 73B): whitish yellow with poorly defined orange-brown scuta; thinly covered with fine light orange hairs. *Legs*: as in ♂. *Epigyne* (Fig. 73D, E).

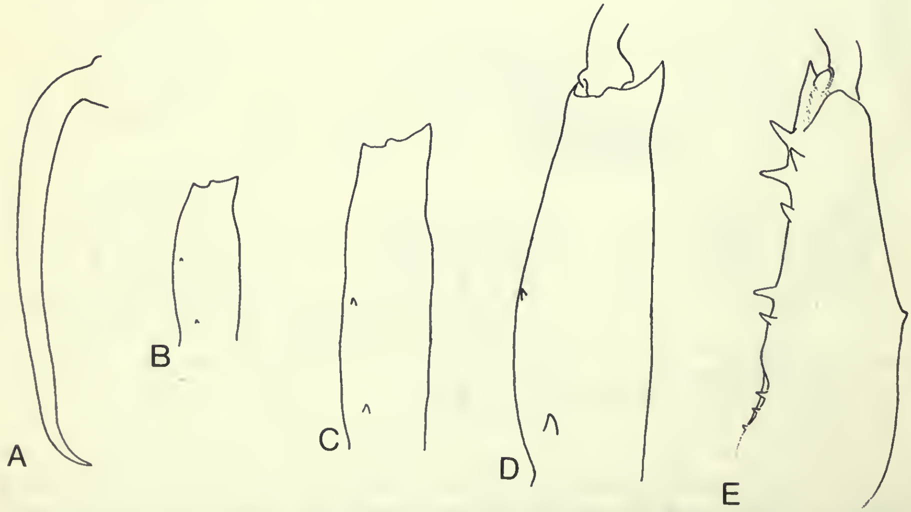

Fig. 74 *Myrmarachne eumenes* (Simon), males from Antongil: (A) fang; (B, C, D) chelicerae, dorsal view, showing variation in size and shape (drawn to scale); (E) chelicera, ventral view.

Dimensions: total length 5·4–7·0 mm, carapace length 2·3–2·5 mm. *Ratios*: AM : AL : PM : PL: 10 : 5 : 1 : 5·5, AL–PM–PL: 6·5–7; a: 1·0–1·02, b: 1·0–1·02, c: 0·38–0·39, e: 0·70–0·79 (10♀ examined).

Depth of colour varies from pale orange to dark reddish in preserved specimens and the abdomen is often marked with blackish transverse bands. The transverse furrows on the posterior margin of the thorax are sometimes poorly defined and the sternum and male maxillae show slight variations in shape. Male chelicerae grow allometrically with the spurs being more strongly developed in larger specimens.

BIOLOGY. Unknown.

DISTRIBUTION. Madagascar.

MATERIAL EXAMINED. Lectotype ♂, data given in synonymy. MADAGASCAR: Beanana, 1♀, vi.1968 (*A. Lambillon*, MT 142972); Beanana, 1♂, v.1970 (*A. Lambillon*, MT 142812); Beanana, 1♀, ii.1970 (*A. Lambillon*, MT 142614); Est Antsirabe, 2♀, 10.x.1970 (*J. Gossuin*, MT 142530, 142576); Vohibe, 1♂, 1 immature, vii.1970 (*A. Lambillon*, MT 142783); Massif Andringitra, Mahasoa, 2100 m, 4♂, 6♀, 11 immatures, x.1971 (*B. Ranson*, MT 142835); Mt. Ambohisanga, 1♂, i.1951 (*A. Pierrard*, MT 142918) (MRAC, Tervuren); S. Marie, 1♂, (*A. Mocqueries*); Diego-Suarez, 2♂, 6♀ (*Ch. Alluaud*); Antongil, 35♂, 4♀ (*A. Mocqueries*) (MNHN, Paris).

The *electrica*-group

This group is comprised of 4 species from Madagascar, *M. electrica* (Peckham & Peckham), *M. andringitra* sp. n. *M. eugenei* nom. n. and *M. peckhami* Roewer. Males are distinguished by the distally, filamentous embolus (Fig. 80A, B), the absence of a flange and lack of modifications to the proximal ectal margin of the cymbium. Females are separated by the median pouch and coiled, distal seminal ducts (Fig. 77D). The 4 species have similar genitalia but *M. eugenei* has a somewhat divergent body form and differs in carapace shape and sculpturing.

Myrmarachne eugenei nom. n.

(Figs 75A–G; 76A–E; Pl. 2e, f)

Emertonius rufescens Simon, 1900 : 405, ♀. LECTOTYPE ♀ (here designated), Madagascar, Diego-Suarez (MNHN, Paris) [Examined]. [Junior secondary homonym of *Myrmarachne rufescens* Thorell, 1877.] Simon, 1901 : 498, 503, 504. Roewer, 1954 : 939. Bonnet, 1957 : 1653. Roewer, 1965 : 78, fig. 70. Prószyński, 1971b : 400.

The male has not previously been described and its discovery makes it clear that this species belongs in the genus *Myrmarachne*. However, the specific name is preoccupied by *M. rufescens* Thorell, 1877. It is now renamed after the original author, M Eugène Simon.

DIAGNOSIS. *M. eugenei* is a very distinctive species readily distinguished from other members of the *electrica*-group by the carapace shape (Fig. 75A, B, F) and unique thoracic sculpturing (Pl. 2e, f).

MALE. *Carapace* (Fig. 75A, F; Pl. 2e, f): finely punctured-reticulate in eye region to irregularly tumulose with scattered piliferous papillae on thoracic part; orange-brown with light yellowish guanin in eye region extending posteriorly to form 3 obscure wedge-shaped marks on hind part of thorax; sparsely clothed with long light brown hairs. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: sparsely fringed with white hairs. *Chelicerae* (Fig. 75D, E, G): rugulose with furrows, with retrolateral and distal prolateral spurs; orange to yellowish orange with blackish lateral keels, shiny; fang apophysis lacking. *Maxillae and Labium*: yellow-orange, with outer distal margin of maxillae drawn to a point. *Sternum* (Fig. 75C): light yellow-orange; sparsely punctured with light orange hairs. *Abdomen* (Fig. 75A, F): anterior margin with distinct cleft; pale yellowish with an undivided light brown scutum and scattered light brown hairs. *Legs*: legs I pale yellowish with metatarsi and sides of tibiae, patellae and femora light orange. Legs II light orange with tarsi and metatarsi pale yellowish. Legs III light orange with distal segments pale yellowish. Legs IV as III but with light orange tibiae. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 0. *Palp* (Fig. 76A, B, D).

Dimensions: total length 5·4 mm, carapace length 2·6 mm. *Ratios*: AM : AL : PM : PL: 12·5 : 7 : 2 : 7, AL–PM–PL: 7–8; a: 1·0, b: 0·98, c: 0·46, d: 0·90, e: 0·74 (1♂ examined).

FEMALE. *Carapace* (Fig. 75B): similar to ♂; orange-brown or dark reddish, the guanin pattern sometimes less conspicuous. *Eyes*: as in ♂. *Clypeus*: as in ♂. *Chelicerae*: finely rugulose; light yellow-brown; promargin with 3 teeth, retromargin with 6 or 7. *Maxillae and Labium*: typical of genus, light yellow-orange. *Sternum*: elongate margins poorly defined; whitish yellow. *Abdomen* (Fig. 75B): greyish yellow sometimes with variable pattern composed of whitish guanin; scuta lacking. *Legs*: whitish. Ventral spination as in ♂ but tibiae 1–2–2–1–2 or 2–2–2–2–2. *Epigyne* (Fig. 76C, E).

Dimensions: total length 4·1–4·48 mm, carapace length 1·9–2·12 mm. *Ratios*: AM : AL : PM : PL: 9·5 : 5 : 1 : 5; AL–PM–PL: 7–6; a: 1·03–1·05, b: 1·07–1·09, c: 0·48–0·50, e: 0·65–0·67 (3♀ examined).

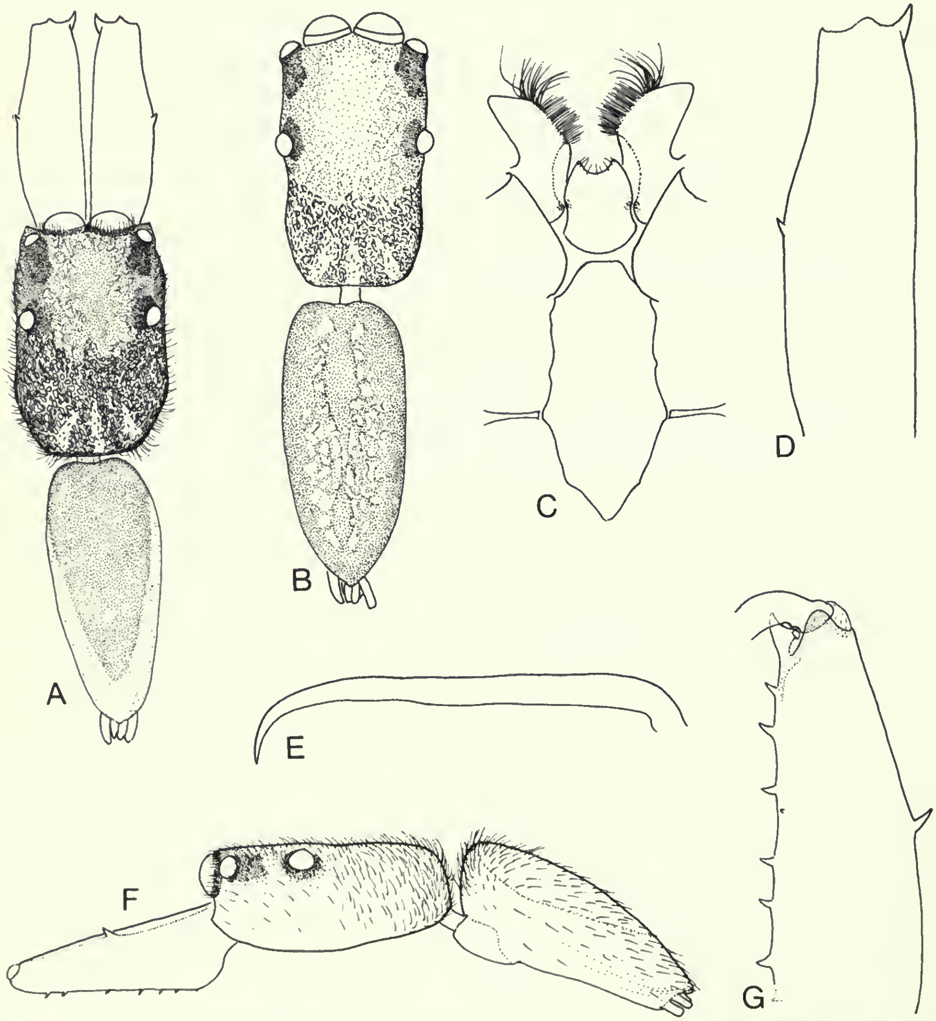

Fig. 75 *Myrmarachne eugenei* nom. n. ♂ from Antongil Bay: (A) dorsal view; (C) maxillae, labium and sternum; (D) chelicera, dorsal view; (E) fang; (F) lateral view; (G) chelicera, ventral view. Lectotype ♀, (B) dorsal view.

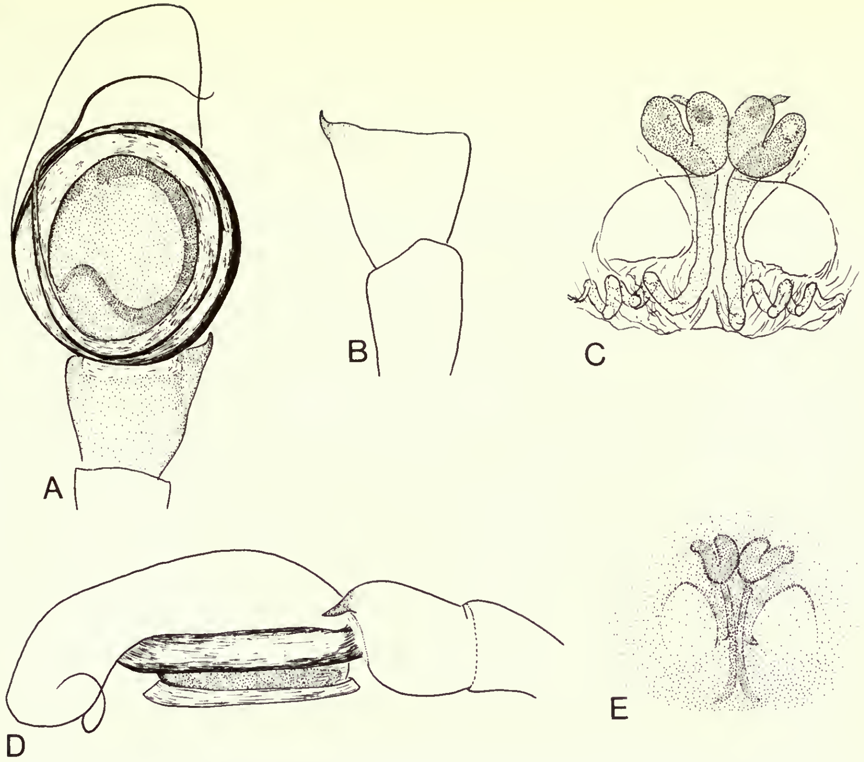

Fig. 76 *Myrmarachne eugenei* nom. n. ♂ from Antongil Bay: (A) palp, ventral view; (B) palpal tibia, dorsal view; (D) palp, lateral view. Lectotype ♀: (C) vulva, ventral view; (E) epigyne, ventral view.

Biology. Unknown.

Distribution. Madagascar.

Material examined. Lectotype ♀, data given in synonymy. Madagascar: Mt Ambohisanga, i.1951, 1♀ (*A. Pierrard* MT 142920) (MRAC, Tervuren); Beparasy, 1♀, ii.1968 (*A. Lambillon*, MT 142737) (MRAC, Tervuren); Beanana, 1♀, ii.1970 (*A. Lambillon*, MT 142601) (MRAC, Tervuren); Antongil Bay, 1♂ (*C. Alluaud*) (MNHN, Paris).

Myrmarachne andringitra sp. n.

(Fig. 77A–D)

Diagnosis. *M. andringitra* is closely related to *M. peckhami* Roewer but may be distinguished by the form of the body (Fig. 77A) and structure of the epigyne (Fig. 77C, D).

Male. Unknown but *andringitra* is sympatric with *M. simplexella* and could belong with that species.

Female. *Carapace* (Fig. 77A, B): finely punctured-reticulate in eye region; light brownish orange with yellowish guanin in eye region. *Eyes*: anteriors subcontiguous with apices level, fringed with white hairs. *Clypeus*: sparsely fringed with pale hairs. *Chelicerae*: rugulose, yellowish, shiny; promargin with 5 teeth, retromargin with 7. *Maxillae and Labium*: yellowish. *Sternum*: elongate; whitish yellow. *Abdomen* (Fig. 77A): whitish yellow. *Legs*: whitish yellow. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2–2, patellae 1. *Epigyne* (Fig. 77C, D).

Dimensions: total length 5·78 mm, carapace length 2·7 mm. *Ratios*: AM : AL : PM : PL: 12·5 : 6·5 : 1 : 7, AL–PM–PL: 9–8; a: 1·04, b: 1·06, c: 0·44, e: 0·94 (1♀ examined).

Biology. Unknown.

Distribution. Madagascar.

Material examined. Holotype ♂, Madagascar, Massif Andringitra, Mahasoa, 2100 m, x.1971 (*B. Ranson*, MT 142833) (MRAC, Tervuren).

Etymology. The specific name is a noun in apposition based on the region where the holotype was collected.

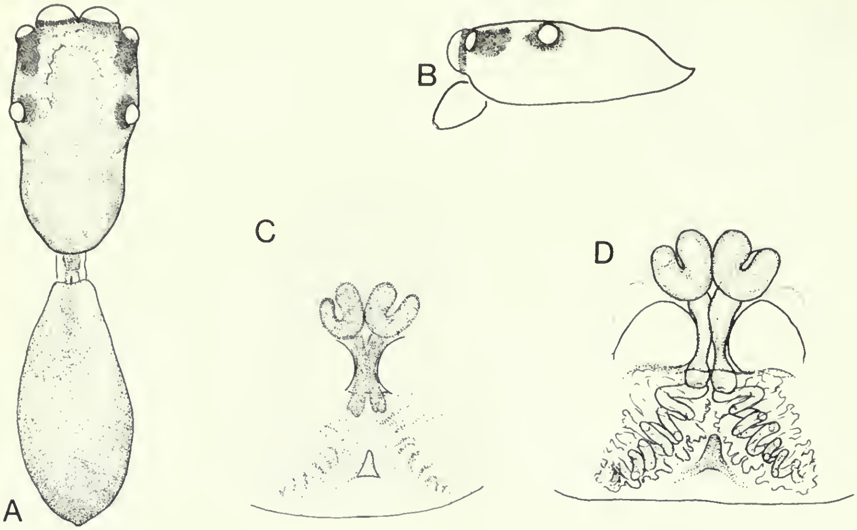

Fig. 77 *Myrmarachne andringitra* sp. n. Holotype ♀: (A) dorsal view; (B) carapace, lateral view; (C) epigyne, ventral view; (D) vulva, ventral view.

Myrmarachne electrica (Peckham & Peckham)

(Fig. 78A–F)

Salticus electricus Peckham & Peckham, 1892 : 25, pl. 1, figs 3, 3a, 3b, ♂. LECTOTYPE ♂ (here designated), Madagascar (MCZ, Harvard) [Examined].

Myrmarachne electrica: Simon, 1901 : 500. Roewer, 1954 : 942. Bonnet, 1957 : 3001. Roewer, 1965 : 65, fig. 32. Prószyński, 1971b : 437.

Diagnosis. *M. electrica* is closely related to *M. peckhami* Roewer but can be distinguished by the apparent lack of thoracic punctures and palp structure (Fig. 78B, D, E). The tibial apophysis is more robust, the embolus has three turns about the tegulum and the reservoir of the ejaculatory duct is proximal and procurved.

Female. Unknown.

Male. *Carapace* (Fig. 78A, F): finely punctured-reticulate in eye region but too poorly defined to be resolved on thoracic part; light brown with eye region yellowish and sooty marks radiating from constriction. *Eyes*: anteriors subcontiguous with apices procurved, sparsely fringed with fine hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Fig. 78C): finely rugulose with furrows with retrolateral and distal, prolateral spurs; light yellow-brown, shiny; fang apophysis lacking. *Maxillae and Labium*: light yellow. *Sternum*: elongate; light yellow with indistinct margins. *Abdomen* (Fig. 78A, F): light yellow with 2 brownish marks either side of constriction; anterior scuta pale yellow-brown, posterior one ill-defined, yellowish with a brownish mark. *Legs*: I and III light yellow-brown with femora I slightly enlarged; legs II and IV missing. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 0. *Palp* (Fig. 78B, D, E).

Dimensions: total length 4·6 mm, carapace length 2·2 mm. *Ratios*: AM : AL : PM : PL: 10·5 : 5·5 : 1 : 5·5, AL–PM–PL: 7–7; a: 1·02, b: 1·02, c: 0·44; d: 0·60 (1♂ examined).

Biology. Unknown.

DISTRIBUTION. Madagascar.

MATERIAL EXAMINED. Lectotype ♂, data given in synonymy.

REMARKS. Although there are a number of characters which distinguish this species from *M. peckhami* I suspect that intermediate forms will be found. The morphology of the embolus and position of the ejaculatory duct may be variable as Kaston (1970) has already described for certain closely related species of *Latrodectus*. The apparent lack of punctures on the thorax of the lectotype specimen of *electrica* does not mean a great deal at the present time as the specimen is somewhat bleached and the sculpturing cannot be properly resolved with the dissecting microscope.

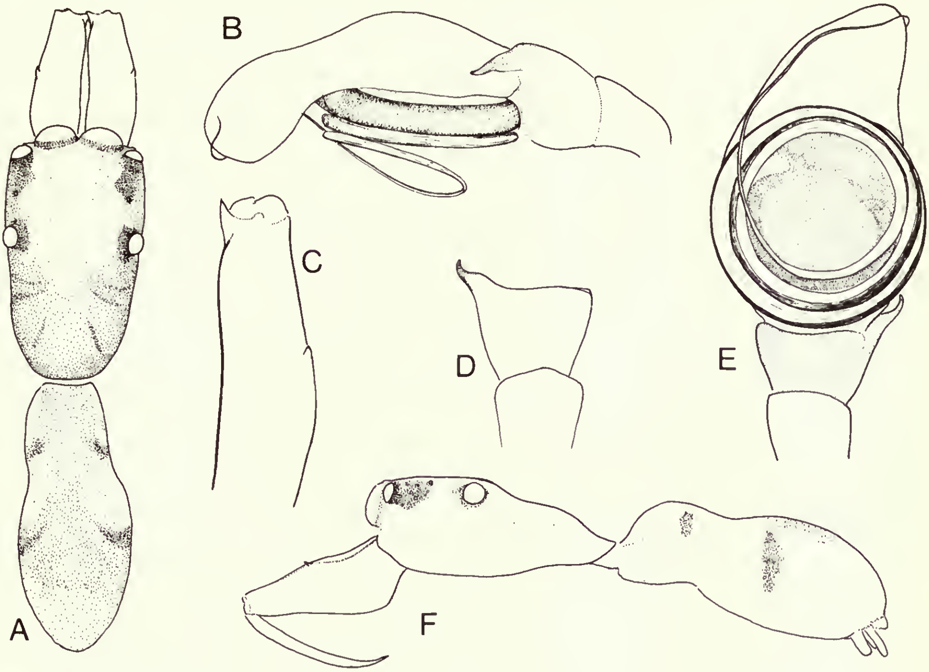

Fig. 78 *Myrmarachne electrica* (Peckham & Peckham). Lectotype ♂: (A) dorsal view; (B) palp, lateral view; (C) chelicera, dorsal view; (D) palpal tibia, dorsal view; (E) palp, ventral view; (F) lateral view.

Myrmarachne peckhami Roewer

(Figs 79A–I; 80A–E)

Salticus gracilis Peckham & Peckham, 1892 : 26, pl. 2, figs 1, 1a, 1b, ♀. LECTOTYPE ♀ (here designated), Madagascar (MCZ, Harvard) [Examined].

Myrmarachne peckhami Roewer, 1951 : 450. *Nom. nov.* pro *Salticus gracilis* Peckham & Peckham, praeocc, Hahn 1831. Roewer, 1954 : 943; 1965 : 67.

Myrmarachne gracilis: Bonnet, 1957 : 3006. Prószyński, 1971b : 438.

DIAGNOSIS. *M. peckhami* is closely related to *M. electrica* (Peckham & Peckham) but can be distinguished by the presence of thoracic punctures and palp structure (Fig. 80A, B). The tibial apophysis is more slender, the embolus has two turns around the tegulum and the reservoir of the ejaculatory duct is distal and recurved. However, see remarks under *M. electrica* (p. 000). Female *peckhami* are very similar to female *M. andringitra* but they are separated by the shape of the carapace and abdomen (Fig. 79B, H) also the distal seminal ducts have fewer coils.

MALE. *Carapace* (Fig. 79A, I): very finely rugulose in eye region with punctures on thoracic part radiating from constriction; dark orange-brown with orange guanin in eye region, shiny. *Eyes*: anteriors contiguous with apices procurved, sparsely fringed with whitish hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Fig. 79D, F, G): finely rugulose with furrows, with retrolateral and distal, prolateral spurs; dark orange-brown, rather shiny; fang apophysis lacking; retromarginal teeth minute. *Maxillae*: yellow-brown. *Labium*: orange with yellow-brown tip. *Sternum* (Fig. 79C): orange with darker margins. *Abdomen* (Fig. 79A, I): whitish yellow with blackish mottling; scuta orange-brown tinged with some black, shiny; ventrally a poorly defined rectangular patch of light yellow. *Legs*: legs I with tarsi, trochanters and coxae light yellowish; metatarsi and femora dark orange; tibiae and patellae light orange. Legs II light yellowish with distal, elongate black spot on inside of femora. Legs III light yellowish with darker femora. Legs IV as III but tibiae and patellae also darker. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 1. *Palp* (Fig. 80A, B).

Dimensions: total length 4·24 mm, carapace length 1·82 mm. *Ratios*: AM : AL : PM : PL: 8·5 : 5 : 1 : 4·5, AL–PM–PL: 5·5–5·3; a: 1·04, b: 1·04, c: 0·43, d: 0·59, e: 0·81 (1♂ examined).

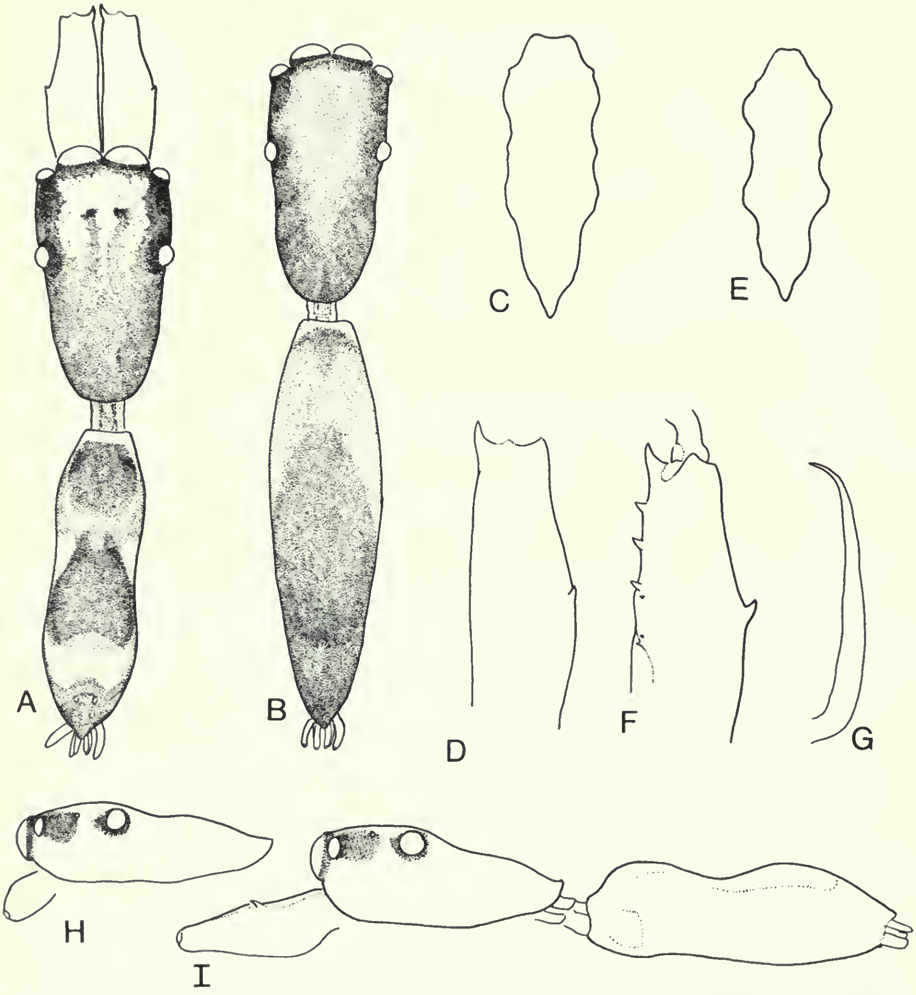

Fig. 79 *Myrmarachne peckhami* Roewer. ♂ from Massif Andringitra: (A) dorsal view; (C) sternum; (D) chelicera, dorsal view; (E) chelicera, ventral view; (G) fang; (I) lateral view. ♀ from same locality: (B) dorsal view; (E) sternum; (H) carapace, lateral view.

Female. *Carapace* (Fig. 79B, H): more or less as in ♂ but eye region very finely rugulose to very finely punctured-reticulate. *Eyes*: as in ♂. *Clypeus*: as in ♂. *Chelicerae*: light brown; promargin with 4 or 5 teeth, retromargin with 6 or 7. *Maxillae and labium*: light brownish orange but inner margin of maxillae and labial tip lighter. *Sternum* (Fig. 79E): light orange, shiny. *Abdomen*:

yellow-tinged with greyish with poorly defined brown-black scuta. *Legs*: legs I tarsi, femora, trochanters and coxae whitish yellow; other segments yellow-orange. Legs II–III as I but tarsi yellow-orange. Legs IV brownish orange with distal segments lighter. Ventral spination of legs I as in ♂. *Epigyne* (Fig. 80C–E): the spermathecal loops show some variation and the coils of the distal seminal ducts are sometimes evident in uncleared epigynes.

Dimensions: total length 4·6–6·0 mm, carapace length 1·94–2·16 mm. *Ratios*: AM : AL : PM : PL: 9 : 5 : 1 : 5, AL–PM–PL: 7–6; a: 1·02–1·03, b: 1·03–1·08, c: 0·41–0·43, e: 0·71–0·75 (5♀ examined).

Biology. Unknown.

Distribution. Madagascar.

Material examined. Lectotype ♀ and paralectotype ♀, data given in synonymy. Madagascar: Massif Andringitra, Mahasoa, 2100 m, 1♂, 3♀, x.1971 (*B. Ranson*, MT 142843) (MRAC, Tervuren).

Remarks. *M. peckhami* has been found in the same vial as *M. andringitra* and *M. longiventris*.

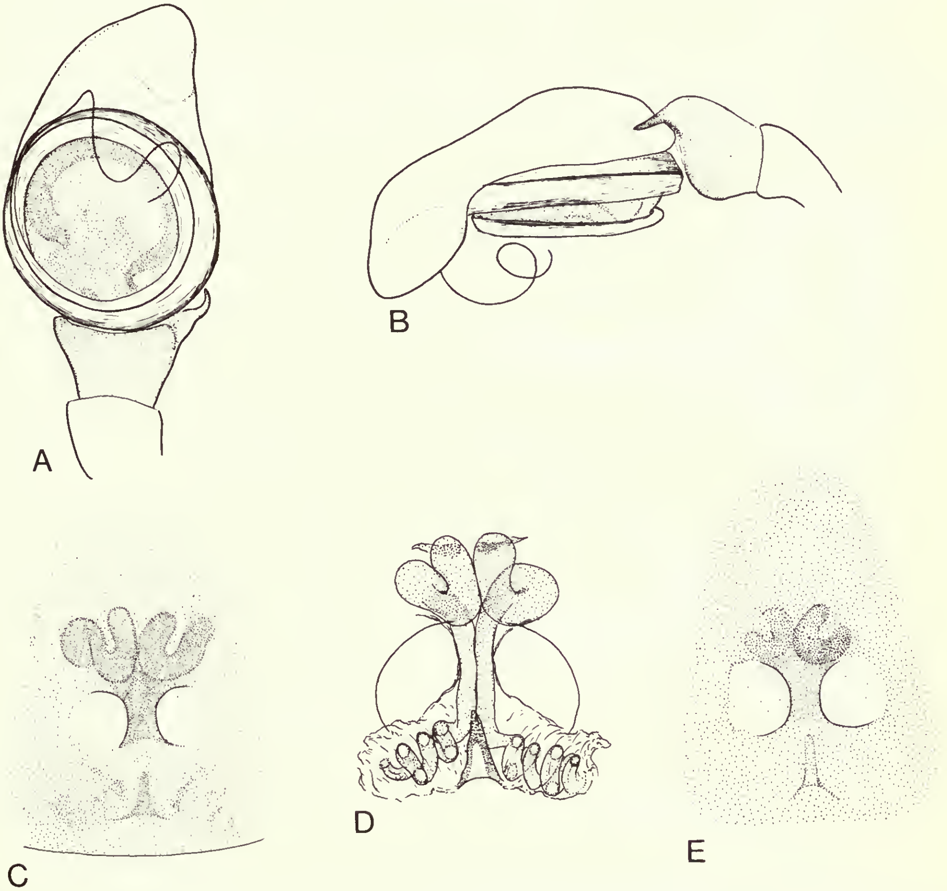

Fig. 80 *Myrmarachne peckhami* Roewer. ♂ from Massif Andringitra: (A) palp, ventral view; (B) palp, lateral view. ♀ from same locality. (C) epigyne, ventral view. Lectotype female: (D) vulva, ventral view; (E) epigyne, ventral view.

Species Sola

Myrmarachne simplexella Roewer

(Figs 81A–J; 82A–E)

Salticus simplex Peckham & Peckham, 1892 : 23, pl. 1, figs 4, 4a, 4b, 4c, ♂. LECTOTYPE ♂ (here designated), Madagascar (MCZ, Harvard) [Examined].
Myrmarachne simplexella Roewer, 1951 : 450. *Nom. nov.* pro *Salticus simplex* Peckham & Peckham, praeocc, Blackwall 1865. Roewer, 1954 : 944; 1965 : 67.
Myrmarachne simplex: Bonnet, 1957 : 3013. Prószyński, 1971b : 440.

DIAGNOSIS. *M. simplexella* is a very variable species of uncertain affinities but the pronounced flange (Fig. 82C–E) with its fringe of long, stout setae is diagnostic.

FEMALE. Unknown but it is possible *M. andringitra* belongs here.

MALE. *Carapace* (Fig. 81A–E, I): punctured-reticulate in eye region with ripples between PL to densely papillate on thoracic part; dark orange-brown with whitish hairs. *Eyes*: anteriors subcontiguous with apices more or less level, fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 81F–H, J): finely rugulose; orange-brown with blackish lateral keels; fang apophysis and retromarginal teeth lacking. *Maxillae*: orange-brown. *Labium*: reddish brown with

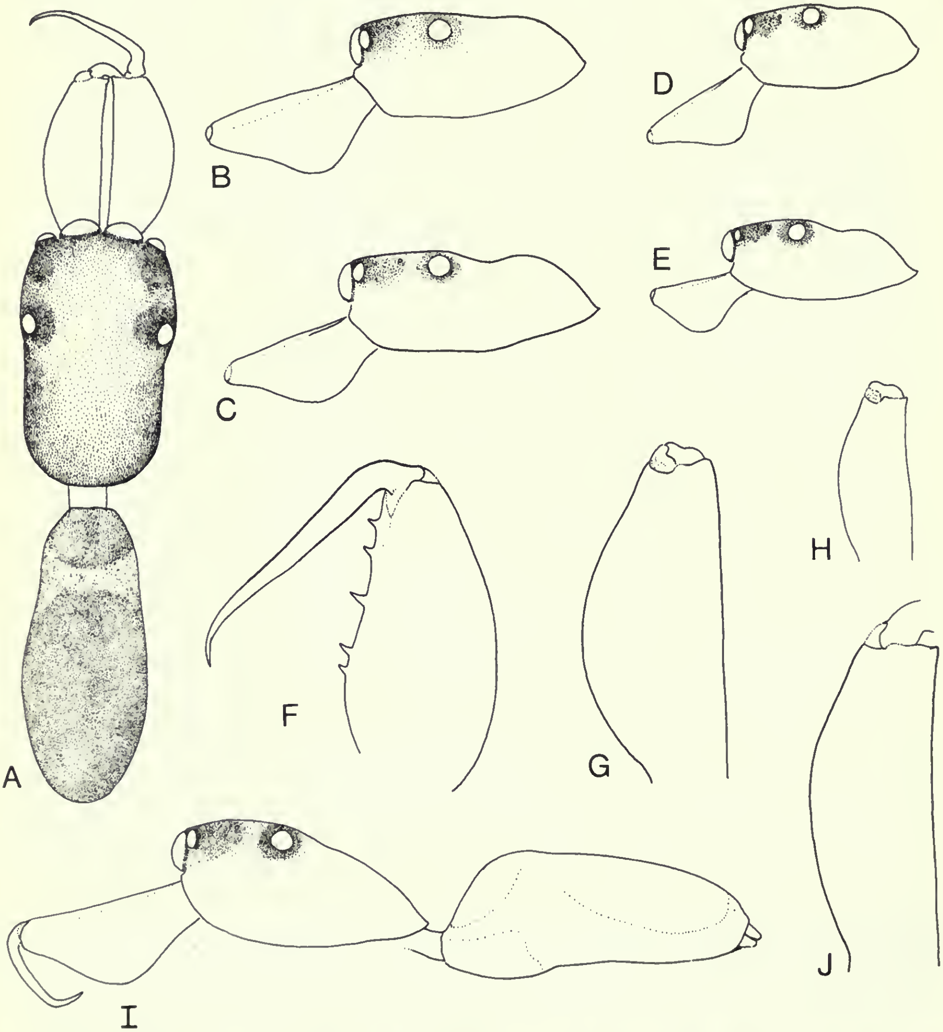

Fig. 81 *Myrmarachne simplexella* Roewer. Lectotype ♂: (A) dorsal view; (F) chelicera, ventral view; (I) lateral view; (J) chelicera, dorsal view. ♂ carapaces showing variation in shape (drawn to scale): (B, C, D) Antongil specimens; (E) from Massif Andringitra. ♂ chelicera showing size variation (drawn to scale): (G) Antongil specimen; (H) from Massif Andringitra.

a median keel. *Sternum*: elongate; orange-brown. *Abdomen* (Fig. 81A–I): yellowish brown with blackish mottling and dark reddish brown scuta; sparsely clothed with yellowish hairs with light orange-brown hairs on the scuta. *Legs*: femora I slightly enlarged; Legs I–II yellow-brown with metatarsi, tarsi proximally and sides of patellae and femora brownish. Legs III–IV generally brownish with lighter tarsi. Ventral spination of legs I: metatarsi 2–2, tibiae usually 2–2–2–2–2, patellae 1 or 2. *Palp* (Fig. 82A–E): rather variable particularly the shape of the flange and the thickness of the embolus.

Dimensions: total length 4·4–6·4 mm, carapace length 2·0–2·9 mm. *Ratios*: AM : AL : PM : PL: 12 : 7 : 2 : 7, AL–PM–PL: 10–9; a: 1·02–1·05, b: 1·02–1·07, c: 0·42–0·47, d: 0·42–0·62, e: 0·67–1·06 (9♂ examined).

This species shows considerable variation in the shape of the carapace (Fig. 81B–E, I) and palp structure (Fig. 82C–E). On the basis of the specimens at hand it is a problem of deciding if the sample consists of one variable species or a group of closely related ones. In view of the fact that the variation is inconsistent I propose to regard *M. simplexella* as a variable species until additional specimens can be examined.

Biology. Unknown.

Distribution. Madagascar.

Material examined. Lectotype ♂ and paralectotype ♂, data as in synonymy. Madagascar: Massif Andringitra, Mahasoa, 2100 m, 3♂, x.1971 (*B. Ranson*, MT 142833); Mt Ambohisanga, 1♂, i.1951 (*A. Pierrard*, MT 142912) (MRAC, Tervuren). Antongil, 3♂ (*A. Mocqueries*) (MNHN, Paris).

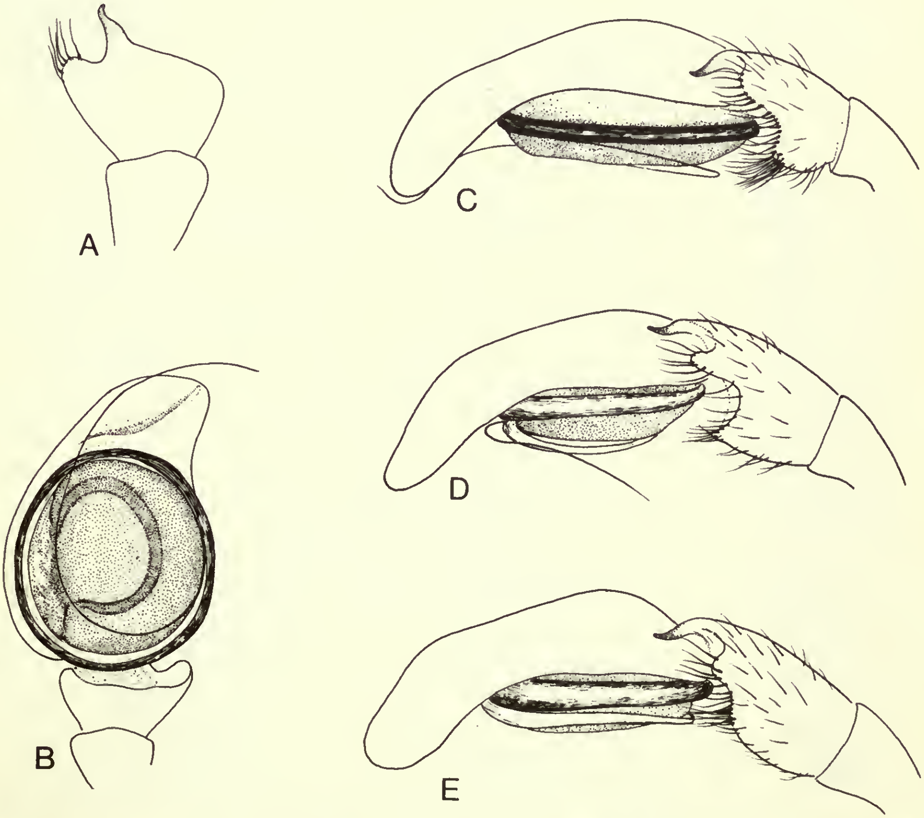

Fig. 82 *Myrmarachne simplexella* Roewer. Lectotype ♂: (A) palpal tibia, dorsal view; (B) palp, ventral view; (C) palp, lateral view. Males from Antongil showing variation in flange shape and embolus thickness: (D) palp, lateral view; (E) palp, lateral view.

Species Sola

Myrmarachne ransoni sp. n.

(Fig. 83A–E)

Diagnosis. *M. ransoni* is a distinctive species readily distinguished from all other Ethiopian *Myrmarachne* by the very large spermathecae (Fig. 83C, E).

Male. Unknown.

Female. *Carapace* (Fig. 83A, D): finely punctured-reticulate grading to finely rugulose in eye region; reddish orange, shiny. *Eyes*: subcontiguous with apices procurved, sparsely fringed with whitish hairs. *Clypeus*: sparsely fringed with light brown hairs. *Chelicerae*: rugose; orange-brown; promargin with 5 teeth, retromargin with 6. *Maxillae and Labium*: light orange-brown tinged with blackish. *Sternum* (Fig. 83B): light orange-brown tinged with black. *Abdomen* (Fig. 83A): whitish yellow with somewhat diffused grey-black pigment (poorly preserved). *Legs*: legs I with tarsi, trochanters and coxae light yellowish; metatarsi dark orange-brown; other segments orange-brown but venter of femora whitish yellow distally. Legs II as I but metatarsi orange-brown and femora whitish yellow. Legs III light orange-brown. Legs IV orange-brown but tarsi, tibiae distally, sides and venter of patellae, trochanters, dorsam and venter of coxae whitish yellow. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2, patellae 1. *Epigyne* (Fig. 83C, E).

Dimensions: total length 5·7 mm, carapace length 2·14 mm. *Ratios*: AM : AL : PM : PL: 10 : 5·6 : 1·5 : 6, AL–PM–PL: 8·5–5; a: 1·03, b: 1·10, c: 0·45, e: 0·85 (1 ♀ examined).

Biology. Unknown.

Distribution. Madagascar.

Material examined. Holotype ♀, Madagascar, Massif Andringitra, Mahasoa, 2100 m, x.1971 (*B. Ranson*, MT 142905) (MRAC, Tervuren).

Etymology. This species is named after the collector Mr B. Ranson.

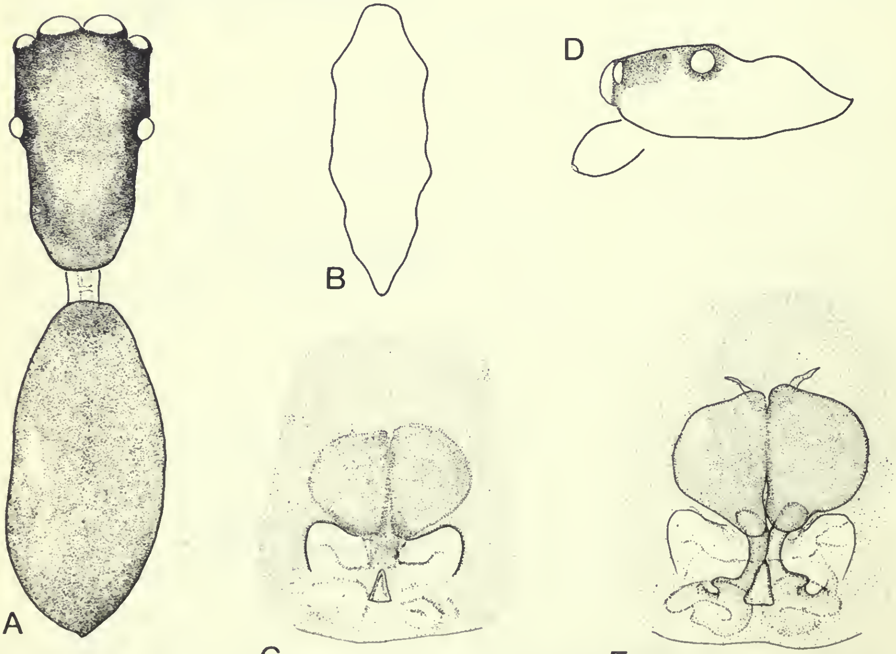

Fig. 83 *Myrmarachne ransoni* sp. n. Holotype ♀: (A) dorsal view; (B) sternum; (C) epigyne, ventral view; (D) carapace, lateral view; (E) vulva, ventral view.

Species Sola

Myrmarachne diegoensis sp. n.

(Fig. 84A–G)

Diagnosis. *M. diegoensis* is a species of uncertain affinities but the presence of small stout setae just below the base of the tibial apophysis (Fig. 84E, G) is diagnostic.

Female. Unknown.

Male. *Carapace* (Fig. 84A, F): eye region finely punctured-reticulate, thoracic part finely papillate; light orange or orange-brown with yellowish guanin in eye region. *Eyes*: anteriors subcontiguous with apices procurved, fringed with white hairs. *Clypeus*: sparsely white haired. *Chelicerae* (Fig. 84B, C): rugulose with furrows; yellowish orange, shiny with dark orange

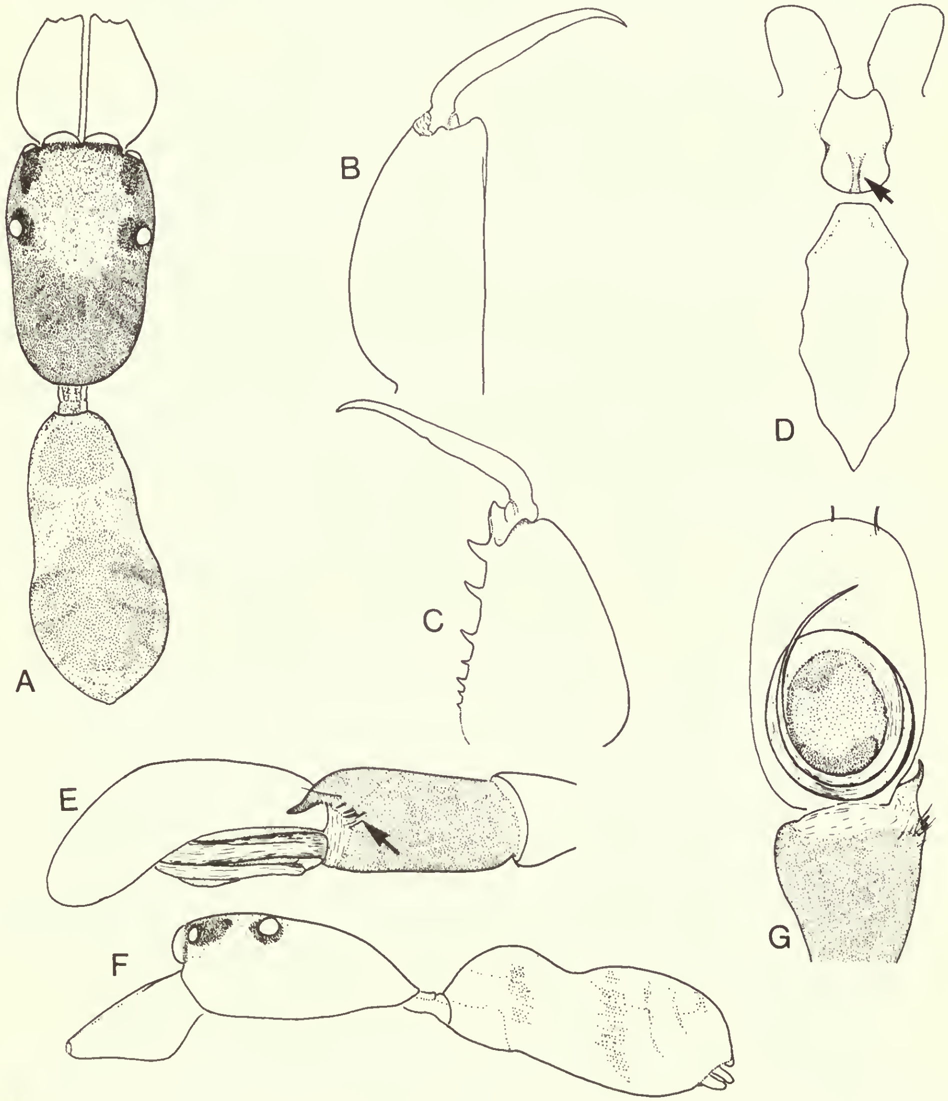

Fig. 84 *Myrmarachne diegoensis* sp. n. Holotype ♂: (A) dorsal view; (B) chelicera, dorsal view; (C) chelicera ventral view; (D) maxillae, labium and sternum; (E) palp, lateral view; (F) lateral view; (G) palp, ventral view.

lateral keels; fang apophysis and retromarginal teeth lacking. *Maxillae*: light orange. *Labium*: light orange with a median keel. *Sternum* (Fig. 84D): pale yellow. *Abdomen* (Fig. 84A, F): whitish yellow with shiny light orange scuta and greyish transverse bands; ventral scuta obscure, light orange; sparsely covered with fine, light orange hairs. *Legs*: light yellowish orange except for metatarsi and tibiae I which are darker. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2, patellae 1. *Palp* (Fig. 84E, G): the number and arrangement of stout setae below the base of the tibial apophysis are variable and they are usually mixed with scattered hairs.

Dimensions: total length 5·1–6·3 mm, carapace length 2·2–2·9 mm. *Ratios*: AM : AL : PM : PL: 11 : 6 : 2 : 6·5, AL–PM–PL: 9–9; a: 0·94–1·0, b: 0·97–1·0, c: 0·41–0·44, d: 0·47–0·58, e: 0·92–1·03 (10♂ examined).

BIOLOGY. Unknown.

DISTRIBUTION. Madagascar.

MATERIAL EXAMINED. Holotype ♂, MADAGASCAR, Diego-Suarez, (*Ch. Alluaud*, MNHN 11012) (MNHN, Paris). Paratypes. MADAGASCAR: 7♂ with same data as holotype; Diego-Suarez, 3♂ (*Ch. Alluaud*, MNHN 12609, 11012, 175.58) (MNHN, Paris).

ETYMOLOGY. The specific name refers to the locality where the holotype was collected.

Species incertae sedis

I have been unable to examine the type material of the following species recorded from East Africa and Zanzibar. The original descriptions are inadequate for their certain identity.

Myrmarachne exultans Caporiacco, 1949 (♀).

Myrmarachne sansibarica Strand, 1910 (♂).

Unavailable names

Mentioned as '*Iola covani*' by Simon (1901 : 503). Misspelling of *Iola cowanii* Peckham & Peckham.

Mentioned as '*M. mexilis*' by Prószyński (1971b : 439). Vial label probably mis-read, incorrect spelling for *M. nexilis* Simon.

Mentioned as '*M. vietei*' by Prószyński (1971b : 441, 519). Incorrect spelling for *M. viettei* Kraus.

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I am also grateful to Dr M. Edmunds, Preston, Dr A. de Barros Machado, Lisbon, Mr & Mrs J. Murphy, London, and Mr A. Russell-Smith, Maun, Botswana, for helping in several ways and for allowing me to study their collections.

Many other colleagues from various institutions (see also list of depositories on p. 3) kindly helped by making the types and other material available for study or in other ways in particular the following: Dr P. Fox (COPR, Maun, Botswana), Dr M. Grasshoff (Frankfurt), Professor T. Kronestedt (Stockholm), Ms J. Lee (Legon, Ghana), J. C. Ledroux (Avignon, France), Professor H. W. Levi (Cambridge, U.S.A.), Dr J. D. Majer (South Bently, Australia), Mr T. J. Perfect (COPR, Ibadan, Nigeria) for specially taking the photographs for Pl. 6, Dr G. Rack (Hamburg), Professor O. W. Richards (London), Mr E. Watt (Maun, Botswana), Mr B. Bolton (BMNH, London) who identified ants and provided the photograph for Pl. 7, Dr Z. Boucek (CIE, London) for helpful discussions on microsculpture; Mr M. C. Day (BMNH, London) who identified wasp larvae and supplied data on spider hunting wasps; Miss E. E. Fejer (BMNH, London) for linguistic help and finally Mr K. H. Hyatt (BMNH, London and Mr D. Macfarlane (CIE, London) for reading the manuscript and linguistic help.

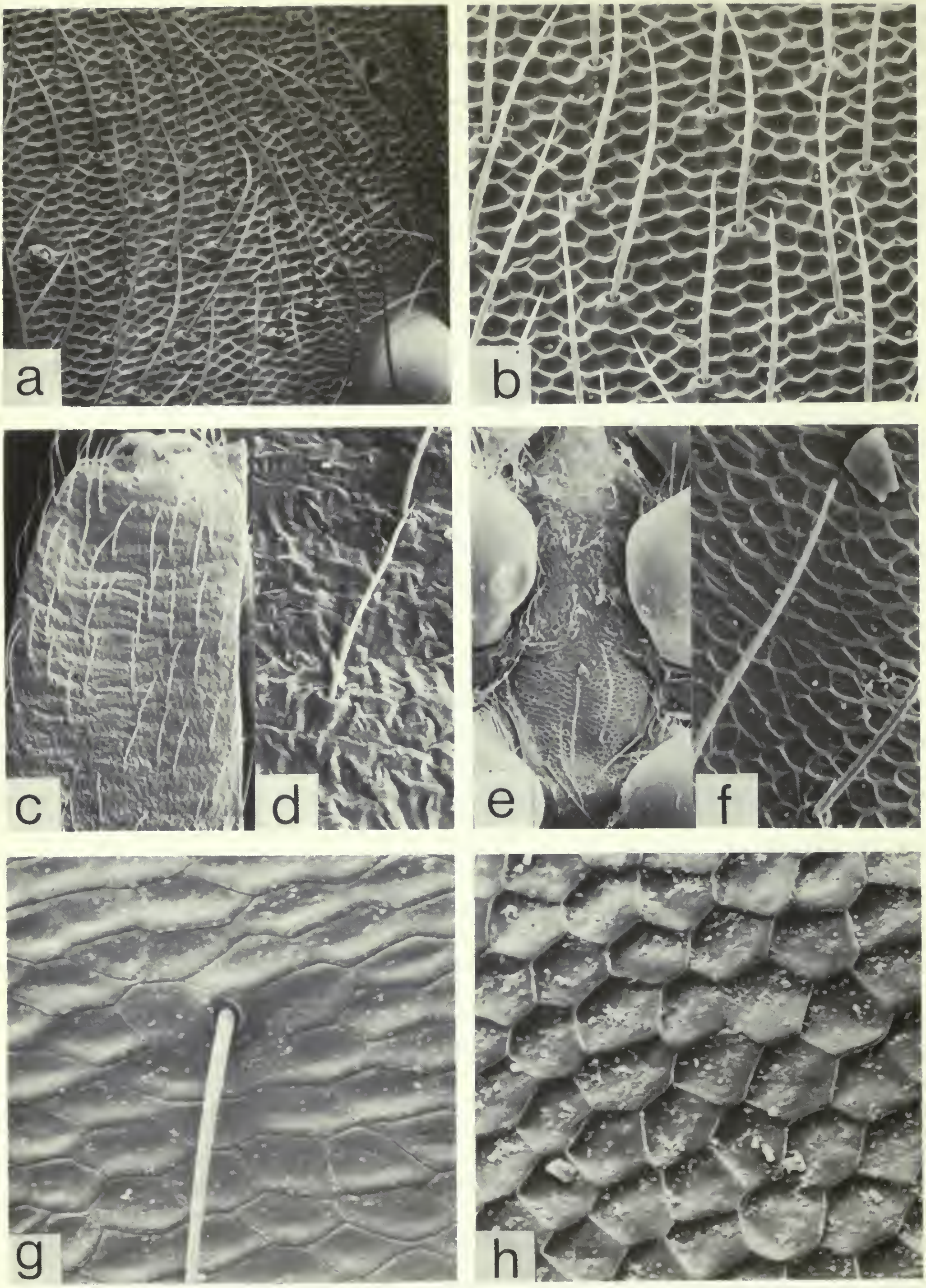

Plate 1 Scanning electron micrographs of cuticle microsculpture. (a, b, c, d) *Myrmarachne marshalli* Peckham & Peckham. ♂: (a, b) posterior part of eye region, punctured-reticulate between piliferous papillae, × 50 and × 500; (c, d) chelicera in dorsal view, rugulose with irregular cross furrows and scattered piliferous papillae, × 100 and × 500. (e, f) *Myrmarachne collarti* Roewer. ♂: sternum, raised reticulate, × 100 and × 500. (g) *Belippo ibadan* sp. n. ♂: dorsal surface of abdomen, alutaceous, × 1000. (h) *Myrmarachne foenisex* Simon. ♂: cephalic region, scaly reticulate, × 1000.

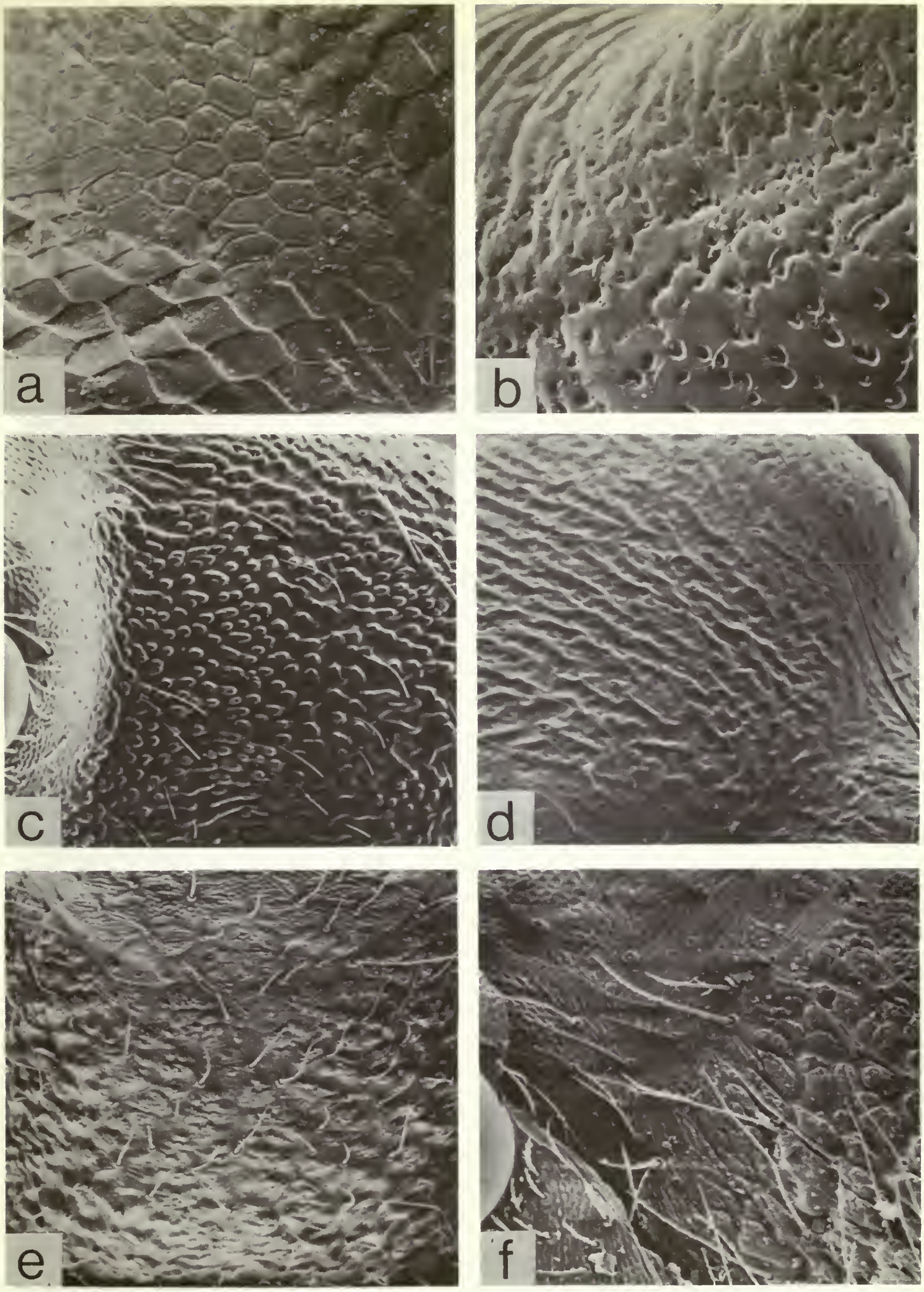

Plate 2 Scanning electron micrographs of cuticle microsculpture. (a) *Myrmarachne foenisex* Simon. ♂: cephalic region, scaly reticulate to engraved reticulate to scaly reticulate, × 1000. (b) *Myrmarachne eumenes* (Simon). ♂: thoracic part, smooth between irregular punctures with irregular furrows around posterior margin, × 200. (c) *Belippo cygniformis* sp. n. ♂: thoracic part, densely papillate with irregular ripples, × 200. (d) *Belippo ibadan* sp. n. ♂: eye region between PL, rippled, × 200. (e, f) *Myrmarachne eugenei* nom. n. ♀: thoracic part and posterior of head region, punctured-reticulate to irregularly tumulose with scattered piliferous papillae, × 100 and × 200.

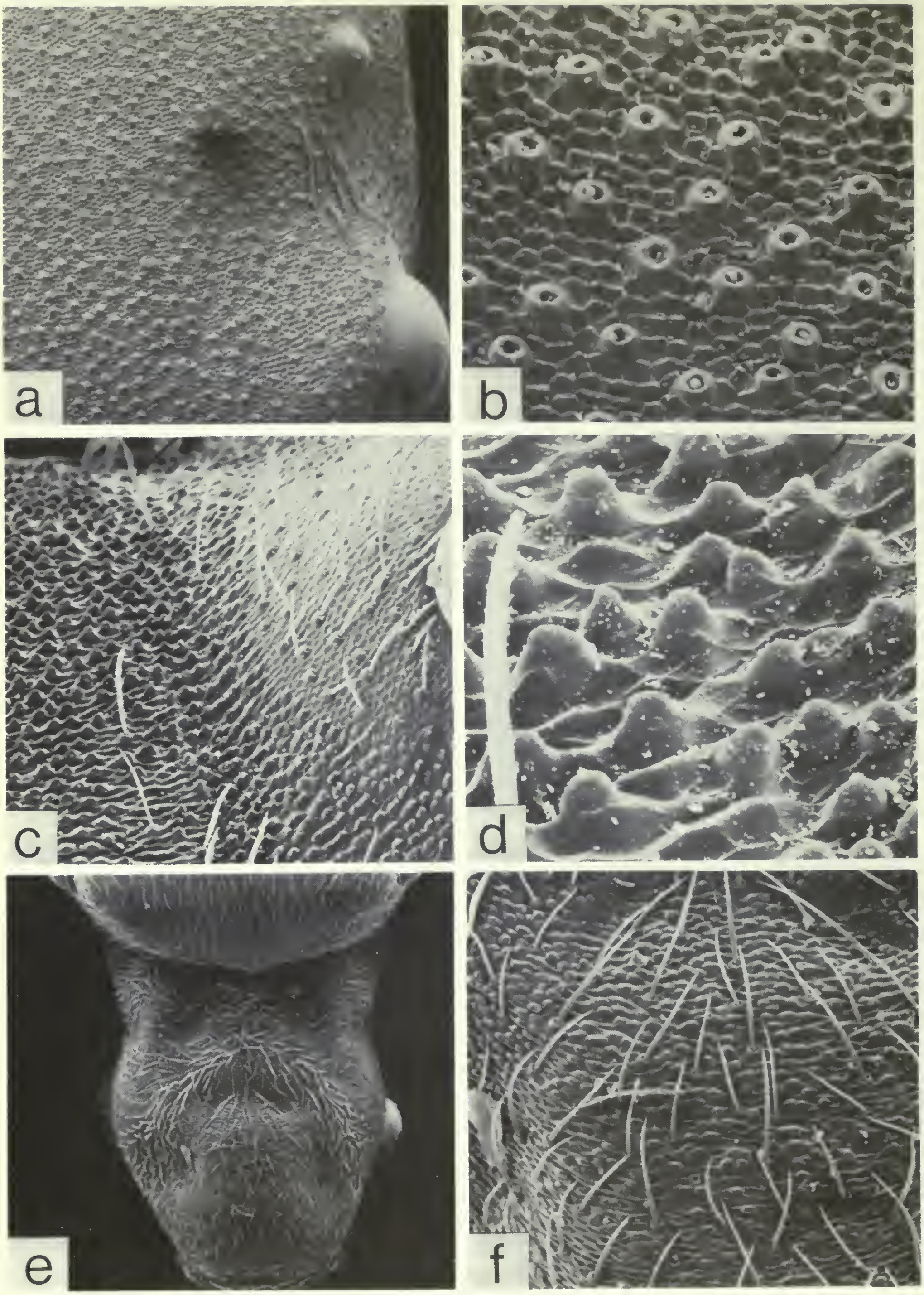

Plate 3 Scanning electron micrographs of cuticle microsculpture. (a, b) *Myrmarachne globosa* sp. n. ♀: cephalic region in dorsal view, punctured-reticulate between moderately dense piliferous papillae, × 100 and × 500. (c, d) *Myrmarachne kilifi* sp. n. ♀: thoracic part in lateral view, irregularily punctured-reticulate between dense papillae and scattered piliferous papillae, × 200 and × 1000. (e, f) *Myrmarachne foenisex* Simon. ♂: thoracic part and posterior of head region, irregularily punctured-reticulate between dense papillae and piliferous papillae, × 50 and × 200.

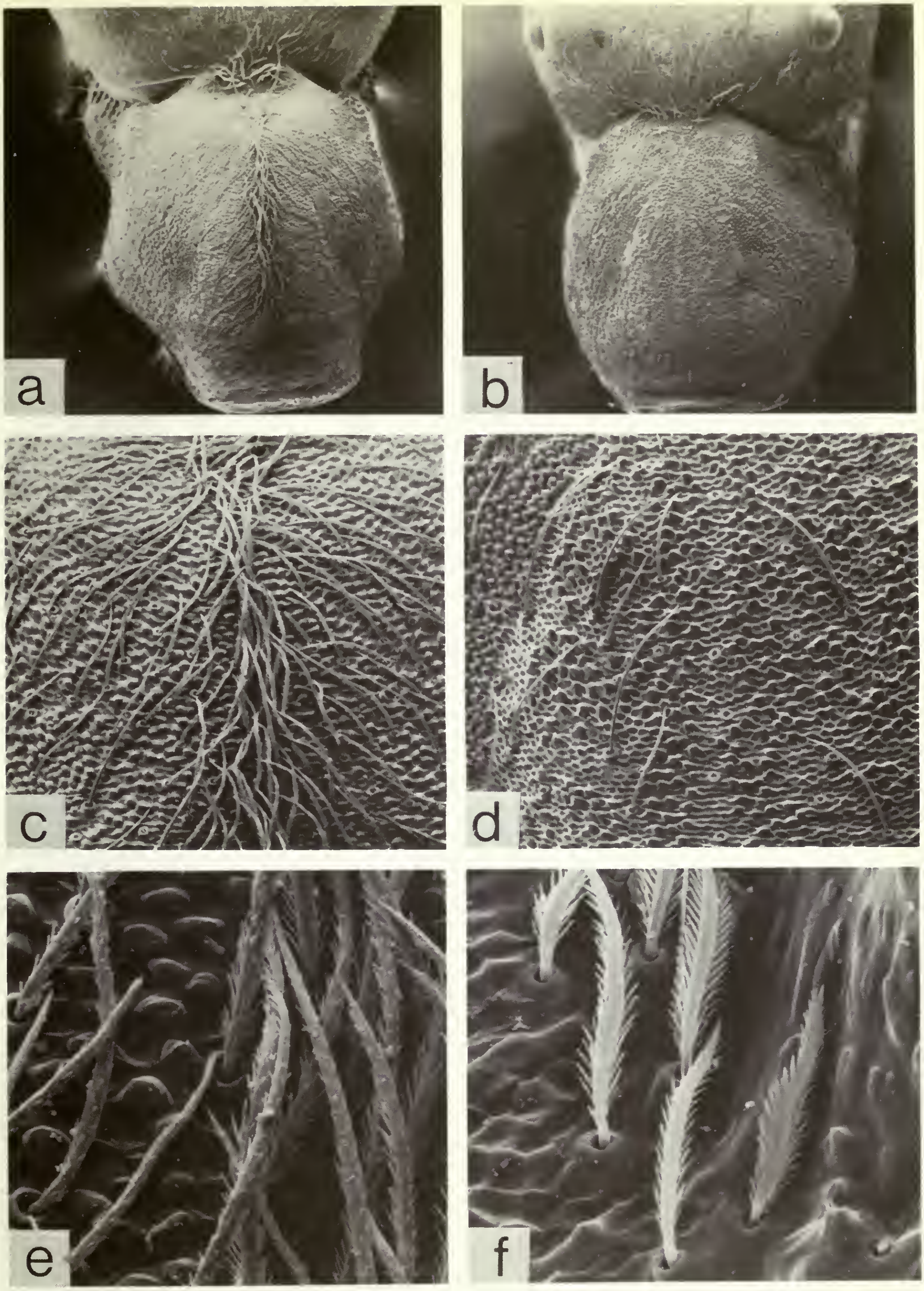

Plate 4 Scanning electron micrographs of cuticle microsculpture and setae. (a, c, e) *Myrmarachne marshalli* Peckham & Peckham. ♂: (a) thoracic part showing longitudinal fringe, × 100; (c) thoracic part with fringe, irregularily punctured-reticulate with dense, irregular patterns of papillae and scattered piliferous papillae, × 200; (e) setae in longitudinal fringe, × 2000. (b, d) *Myrmarachne legon* sp. n. ♂: (b) thoracic part showing absence of longitudinal fringe, × 100; (d) thoracic part, similar to *marshalli* but pattern of piliferous papillae less dense, × 200. (f) *Myrmarachne legon* sp. n. ♂: setae in postocular constriction, × 2000.

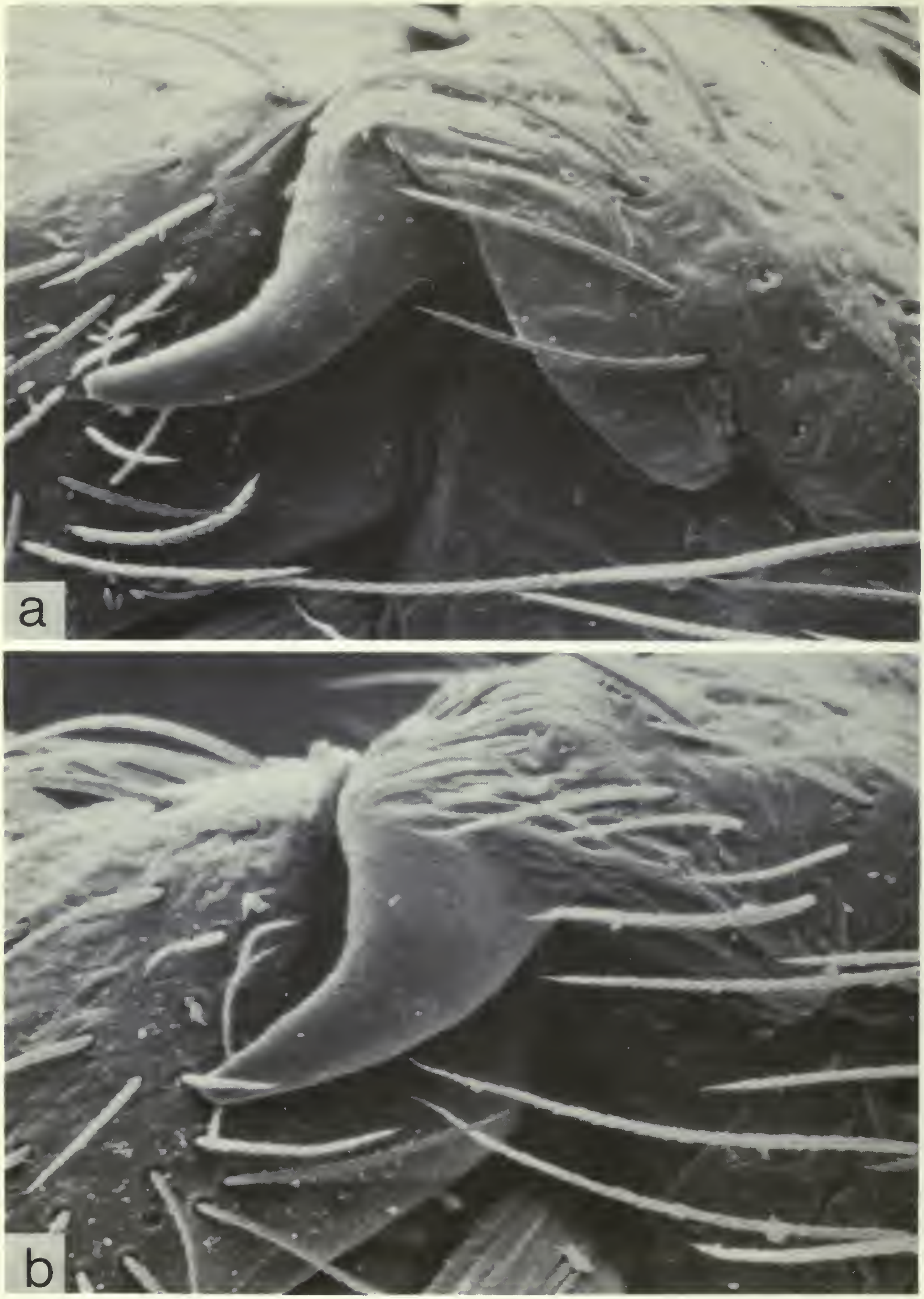

Plate 5 Scanning electron micrographs of *Myrmarachne dundoensis* sp. n., showing variation in apophysis and flange development. (a) ♂ from Dundo, apophysis more slender, flange well developed, × 500. (b) ♂ from same locality as a, apophysis less slender, flange poorly developed, × 500.

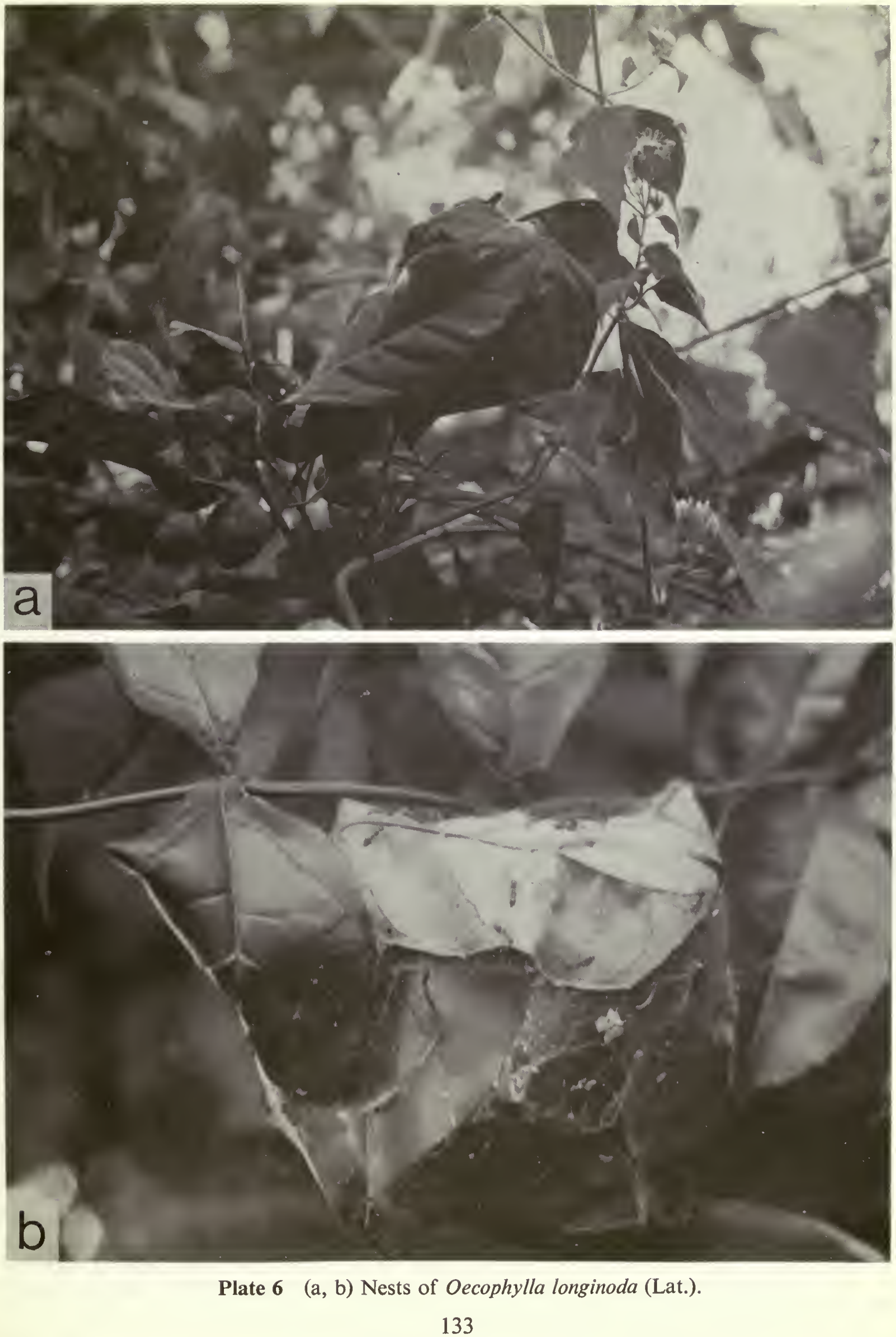

Plate 6 (a, b) Nests of *Oecophylla longinoda* (Lat.).

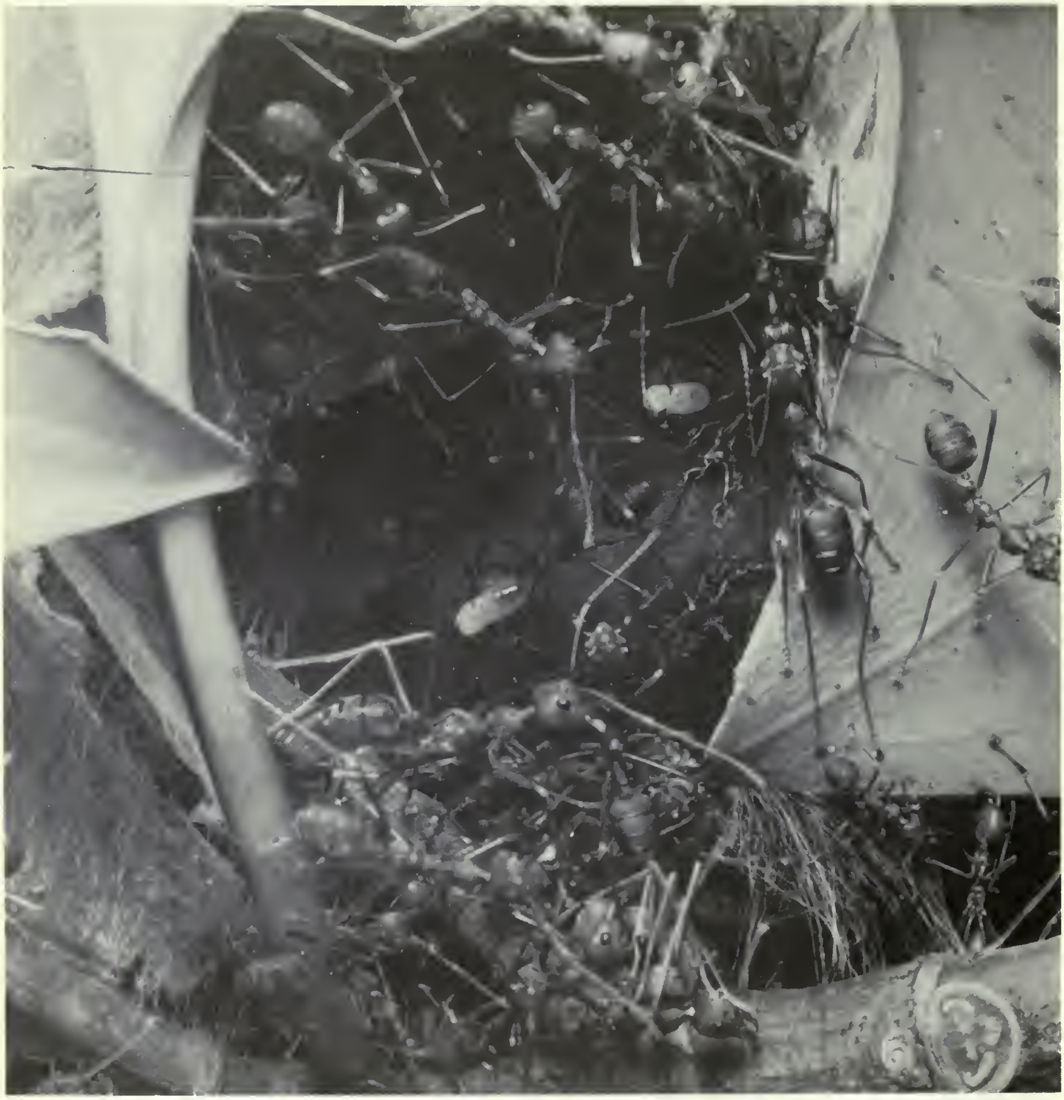

Plate 7 Opened nest of *Oecophylla* sp. (Photographer unknown.)

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Index

Names printed in italics refer to synonyms and other unavailable names; numbers in bold face refer to figures in the text and numbers in italics refer to the main entry.

abimva, Myrmarachne, 51, 52
acvapimensis, Camponotus, 21, 71, 72
akermani, Myrmarachne, **65**, **66**, 67
albosetosa, Myrmarachne, 24, 106, **107**, *108*, **108**
ambigua, Mesoponera, 18, 21
andrewi, Myrmarachne, 25, 26, 98, *103*, **104**, **105**
andringitra, Myrmarachne, 26, 115, *117*, **118**, **119**, 121, 122
anguina, Belippo, 5, *7*, **9**, 10
angusta, Salticus, 109
angustiformis, Myrmarachne, 109
anthracina Tetraponera, 21
Araneidae, 18
atra, Myrmarachne, 51
augusta, Myrmarachne, 24, 106, *109*, **110**, 111
augustus, Salticus, 73, 109

bamakoi, Myrmarachne, 25, 69, **72**, *73*, 82
Belippo, 2, **4**, *5*, 7, **8**, 9, 10, 18–21
benoiti, Myrmarachne, 67
bequaerti, Anochetus, 18, 21
Bizone, 18, 20
Bizonella, 18
bredoi, Myrmarachne, 67
burgeoni, Myrmarachne, 67, **68**

caheni, Myrmarachne, **54**, 55
calcarata, Belippo, 7, *11*, **12**, 13, 21
calcarata, Myrmarachne, 11
Camponotus, 21, 69, 84, 90
chelata, Myrmarachne, 46
Chrysilleae, 18
Clubionidae, 18, 21
collarti, Myrmarachne, 21, 24, **48**, *49*, 128
confusus, Myrmarachne, 10, 24, *46*, **47**, 49
constricta, Myrmarachne, 23
coppeti, Myrmarachne, **49**, **50**, 51, **53**
Cosmophasis, 18, 23, 54
cowani, Myrmarachne, 73
cowanii, *Iola*, 18, 73, 126
cowanii, Myrmarachne, 25, 26, *73*, **74**, **75**, 109
covani, *Iola*, 126
Crematogaster, 21, 71, 72, 93, 95, 97
cygniformis, Belippo, 7, **15**, *16*, **17**, 129

dartevellei, Myrmarachne, 51
depressa, Crematogaster, 18, 21
diegoensis, Myrmarachne, 24, 106, *125*, **125**
diversicoxis, Myrmarachne, **78**
diversipes var tristis, Myrmarachne, 64
Dolichoderinae, 22
dundoensis, Myrmarachne, 21, 25, 27, 73, 79, *82*, **83**, **84**, 132

eidmani, Myrmarachne, 20, 24, 28, 29, **38**, *39*
electrica-group, 19, 23, 106, 114, *115*
electrica, Myrmarachne, 24, 115, *118*, **119**
electricus, Salticus, 118
elongata, Myrmarachne, 20–29, 46, **49**, **50**, *50*, **51**, 52, **53**, 55, 57, 59
Emertonius, 19
Enoplomischus, 18
Eresidae, 18
eugenei, Myrmarachne, 19, 24, 26, *115*, **116**, **117**, 129
eumenes, Myrmarachne, 23, 26, **113**, *114*, **114**, 129
eumenes, Salticus, 114
evidens, Myrmarachne, 24, *42*, **43**, **44**, 45, 46, 52
exultans, Myrmarachne, 126

faradjensis, Myrmarachne, 51
foenisex, Myrmarachne, 2, 20–24, 27, 55, **59**, *60*, **60**, 61, 62, 72, 128–130
foreli, Myrmarachne, 21, 25, 27, 57, 79, *85*, **85**
formicaria-group, 20, 23, 29, 57, *73*, 82, 85, 91, 94
formicaria, Myrmarachne, 73

geminata, Solenopsis, 21, 23
giltayi, Myrmarachne, 20, 25, 28, 29, **34**, **35**, *36*, **37**
globosa, Myrmarachne, 26, **97**, **98**, *99*, 100, 130
Gnaphosidae, 18
gracilis, Myrmarachne, 119
gracilis, Salticus, 119

Hemichalybion, 23
Hermosa, 2, 18
hesperia, Myrmarachne, 24, 42, **43**, **44**, **45**, *46*, 47, **49**, **50**, 51–53
hesperius, Myrmarachne, 46, 50
hesperius, Salticus, 46

ibadan, Belippo, 7, **15**, *16*, **17**, 21, 128, 129
ichneumon, Myrmarachne, 20, 24, 27, 29, 52, *56*, **57**, **58**, 84
ichneumon, Salticus, 56
inflatipalpis, Myrmarachne, 21, 26, 92, **94**, *95*, **96**
insulana, Myrmarachne, 21, 27, 39, *40*, **41**, 42, 46, 52
Iola, 2, 18

kasia, Myrmarachne, 51
kiboschensis, Myrmarachne, 20–22, 26, 27, 52, 75, **77**, *78*, 79, 80, 82

kilifi, Myrmarachne, 25, 26, 98, **100**, **101**, *102*, **102**, 130
kitale, Myrmarachne, 26, 27, 92, *94*, **94**, 95, **96**

Larrinae, 23
laurentina, Myrmarachne, 25, 26, 98, *99*, **100**, **101**, **102**
Latrodectus, 119
lawrencei, Myrmarachne, 25, 27, **28**, **29**, 30, **31**, *32*, 33–35, 67
legon, Myrmarachne, 3, 21–29, 52, 64, 67, *69*, **70**, **71**, 72, 131
leleupi, Myrmarachne, 26, 75, 79, *80*, **80**, **81**, 82
lesserti-group, 19, 23, *106*
lesserti, Myrmarachne, 24, *106*, **107**, **108**
longinoda, Oecophylla, 21, 22, 61, 133
longipes, Anoplolepis, 21, 23
longiventris, *Bizone*, 18, 105, 106
longiventris, *Bizonella*, 105
longiventris, Myrmarachne, 20, 26, 98, **104**, **105**, *105*, 106, 121
luachimo, Myrmarachne, 20, 25, 27–29, **34**, **35**, 36, *37*, 37, 39
lulengana, Myrmarachne, 25, 27, 30, **31**, 32, *33*, **33**, 36, 37
lulengensis, Myrmarachne, 25, 52, **54**, *55*, 57

maerens, Myrmarachne, 30
mahasoa, Myrmarachne, 26, 110, **111**, *112*, 112
majungae, Myrmarachne, 98
majungana, Myrmarachne, 98
marshalli, Myrmarachne, 3, 21, 23, 25, 27, 29, 52, 64, 65, **66**, *67*, **68**, 69, 128, 131
melanocephala, Myrmarachne, 18
mexilis, Myrmarachne, 126
militaris, Myrmarachne, 24, 27, **28**, **29**, *30*, **31**, 32–34
milloti, Belippo, 7, 11, *13*, **14**
milloti, Myrmarachne, 13
Miscophini, 23
moto, Myrmarachne, 51, 52
mulungu, Myrmarachne, 67, **68**
mussungue, Myrmarachne, 20, 27, 40, **41**, *42*
Myrmarachne, 2, 4, 5, **6**, **8**, 9, *18*, 19–23, 66, 106, 109, 110, 115, 124
Myrmarachneae, 2
Myrmicinae, 18

naro, Myrmarachne, 24, 42, **43**, *43*, **44**, **45**, 46
natalensis, Tetraponera, 21, 86
natalica, Myrmarachne, 20, 27, *39*, **40**
nexilis, Belippo, 7, **9**, *9*, 10, 48
nexilis, Myrmarachne, 9, 10, 46, 48, 126
nigeriensis, Myrmarachne, 21, 26, 27, 86, *88*, **89**, **90**
nubilis-group, 19, 23, *110*
nubilis, Myrmarachne, 26, 110, *111*, **111**, **112**

Oecophylla, 23, 134

paucidentata, Myrmarachne, **29**, 30
peckhami, Myrmarachne, 24, 26, 106, 115, 117, 118, *119*, **120**, **121**
Pheidole, 13, 21
Pison, 23, 54, 63, 71
placidum, Trypoxylon, 23
Plagiolepis, 21, 23
plataleoides, Myrmarachne, 2, 20–23
Pompilidae, 23
Ponerinae, 18
Prenolepis, 21, 22
procera, Calotropis, 72
Pseudicus, 23, 54
punctata, Myrmarachne, 39

ransoni, Myrmarachne, 26, *124*, **124**
rica, Castianeira, 23
richardsi, Myrmarachne, 23, 24, 60, *61*, **62**, 91
riveti, Myrmarachne, **66**, 67, **68**
rufescens, Emertonius, 115
rufescens, Myrmarachne, 115
rufisquei, Myrmarachne, 24, *55*, **56**
rufula var tristis, Salticus, 63
russellsmithi, Myrmarachne, 25, *92*, **93**, 94, 95

Salticidae, 1, 2, 18
Salticus, 2
sansibarica, Myrmarachne, 126
Sarinda, 7
Sceliphron, 23
schoutedeni, Myrmarachne, **28**, **29**, 30
sericeus Camponotus, 21, 88
Setaria, 79
simplex, Myrmarachne, 122
simplex, Salticus, 122
simplexella, Myrmarachne, 24, 111, 117, *121*, **122**, **123**
smaragdina, Oecophylla, 21
Solenopis, 21, 22
solitaria, Myrmarachne, 27, *75*, **76**, 79, 80
solitarius, Myrmarachne, 75, 108
Sphecidae, 23
Synemosyninae, 18

Telamonia, 23, 54
Tetramorium, 21
Theridiidae, 18
Thomisidae, 18
tristis-group, 20, 23, *28*, 29, 39, 60, 73, 82, 85, 91
tristis, Myrmarachne, 25, 27, *63*, **63**, **64**, 66, 67, 69
tristis, Salticus, 63
troglodytes, Odontomachus, 21, 79
Trypoxylon, 23
Trypoxyloninae, 23

uelensis, Myrmarachne, 26, 75, 79, **80**, **81**, *82*
uvira, Myrmarachne, 21, 22, 25, 27, 79, *86*, **87**, 88

vanessae, Myrmarachne, 25, 27, 62, *91*, **91**
vetitus-group, Camponotus, 21, 79
vietei, Myrmarachne, 126
viettei, Belippo, 7, 10, *10*, **11**
viettei, Myrmarachne, 10, 126
volatilis-group, 19, 23, *97*, 102, 103, 106
volatilis, *Hermosa*, 18, 98
volatilis, Myrmarachne, 26, **97**, *98*, **98**, 99, 100

Zodariidae, 18

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A revision of the Lake Victoria *Haplochromis* species (Pisces, Cichlidae), Part VIII

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Contents

Introduction 141
- *Haplochromis crocopeplus* sp. nov. 142
- *Haplochromis sulphureus* sp. nov. 148
- *Haplochromis plutonius* sp. nov. 151

Comments on the *Haplochromis tridens* species complex 155
New species of the *H. serranus* group 157
- *Haplochromis nanoserranus* sp. nov. 157
- *Haplochromis cassius* sp. nov. 161

A new species of the *H. empodisma–H. obtusidens* group 164
- *Haplochromis ptistes* sp. nov. 164

New species of the *H. ishmaeli–H. pharyngomylus* group 169
- *Haplochromis teegelaari* sp. nov. 169
- *Haplochromis mylergates* sp. nov. 174

Acknowledgements 179
Appendix: The live coloration of certain previously described *Haplochromis* species, by M. J. P. van Oijen 180
References 192

Introduction

Seven of the eight species described in this paper were collected during June 1975 by Drs G. Ch. Anker and C. D. N. Barel in the Mwanza and Speke Gulf regions (Tanzania) of Lake Victoria. The material was taken from trawl catches made, in general, over mud substrata and, for the most part, at depths of 2–10 m; one station, however, was considerably deeper (28 m); see Fig. 1. The eighth species is from much deeper water (50–60 m) in the northern (Ugandan) part of the Lake; it was collected by the senior author in 1970 during a survey cruise in the R.V. *Ibis*, then based at Jinja as part of a joint U.N.D.P.–E.A.F.F.R.O. research project into the fishery potential of Lake Victoria. All eight taxa must be considered elements of the still largely unknown offshore complex of *Haplochromis* species, now, or soon to be tapped by the developing trawl fishery on the lake.

On the basis of data from collections made in various parts of Lake Victoria, it seems likely that the Mwanza and Speke Gulf species are confined to relatively shallow and sublittoral habitats, while the Ugandan species is restricted to deeper waters. It may be of some significance that none of the new Tanzanian species has been recorded from other and similar biotopes in the lake, yet they were captured together with several species known to have a lake-wide distribution in such habitats.

The new species are of particular interest because they include three new members of the *H. tridens* species complex, two additions to the *H. ishmaeli–H. pharyngomylus* grade of mollusc crushers, a new member of the *H. empodisma–H. obtusidens* mollusc–insectivore lineage, and the first 'dwarf' member of the *H. serranus* lineage, a group of piscivorous species whose members otherwise reach some of the larger adult sizes found among the Lake Victoria species. (For

Bull. Br. Mus. nat. Hist. (Zool.) **33** (2): 141–192 Issued 23 February, 1978

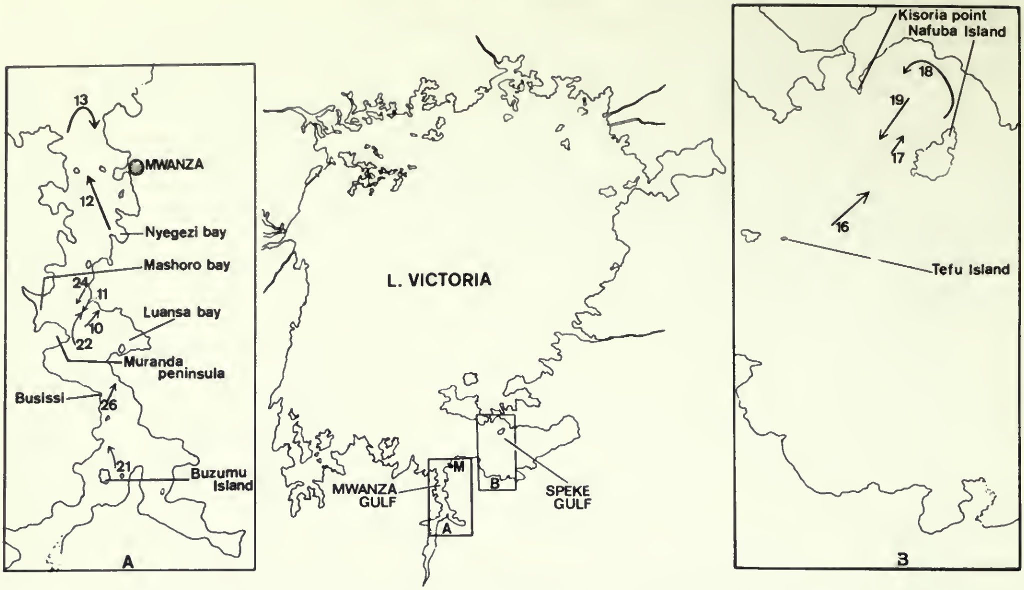

Fig. 1 Sketch map of Lake Victoria with (A) the Mwanza Gulf, and (B) the Speke Gulf, drawn to a larger scale. The numbers refer to Anker–Barel collecting stations, and the arrows to the direction in which the trawl shot at that station was fished.

details of these various groups and their presumed phyletic relationships, see Greenwood, 1974.) The eighth new taxon, also apparently a member of the *H. serranus* lineage, has a most distinctive oral and dental morphology strongly suggestive of fish-eating or other predatory habits, yet it seems to feed, at least in part, on diatoms (see p. 163).

The Anker–Barel collection has also provided a most interesting puzzle in the form of several specimens which appear to bridge the anatomical 'gap' separating the insectivorous–detritus eating *H. empodisma* from its sister species, the insectivorous–molluscivorous *H. obtusidens* (see Greenwood, 1960 & 1974). There are, however, indications that this anatomically intermediate material represents a third taxon in the lineage. Since further observations and material are needed to resolve this problem it, and the new material, will be considered in a later paper.

Drs Barel and Anker were able to gather a lot of useful information on the live coloration of various *Haplochromis* species collected during their visit to the southern end of the lake. An extensive collection of colour transparencies, together with the specimens photographed, has been deposited in the British Museum (Natural History). Many species described or redescribed in previous parts of this revision, and for which no information of live coloration was then available, are represented in the Anker–Barel photographic collection. Colour descriptions of these fishes have been prepared by Mr Martien van Oijen, a postgraduate student in the Zoology Department of Leiden University, and are published as an appendix to this paper.

The eight new taxa will be described in groups based on their presumed phyletic affinities (see Greenwood, 1974), starting with the three new members of the '*tridens*' lineage.

New species of the *H. tridens* group

Haplochromis crocopeplus sp. nov.

HOLOTYPE. An adult male, 84·0 mm standard length, from the Speke Gulf, between Nafuba and Tefu Islands at a depth of 28 m. BM(NH) reg. no. 1977.1.10:70.

The trivial name (from the Greek) refers to the basically ochrous-yellow coloration of live fishes.

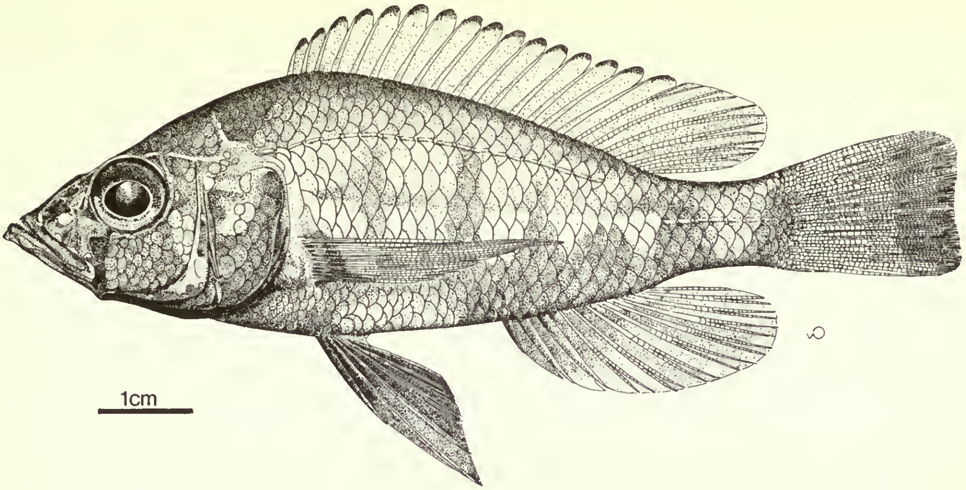

Fig. 2 *Haplochromis crocopeplus*. Holotype. Drawn by M. J. P. van Oijen.

Description (Figs 2–7). Based on 20 specimens (including the holotype), 71·0–100·5 mm standard length.

Depth of body 29·0–35·0% of standard length (mean, M = 33·0%), length of head 34·0–38·0 (M = 36·0)%.

Dorsal head profile straight, sloping at an angle of 30–35°; cephalic lateral line pores prominent, especially the pores and tubules on the preorbital bone.

Preorbital depth 15·0–19·0 (M = 17·0)% of head length, least interorbital width 18·0–22·0 (M = 19·5)%. Snout as broad as it is long, to slightly longer than broad (1·1 times); its length 29·0–31·0 (M = 30·0)% of head. Eye and orbit slightly elliptical (i.e. longer than deep), the eye with a narrow anteroventral aphakic aperture; greatest eye diameter 28·0–33·0 (M = 30·0)% of head. Cheek depth 17·0–25·0 (M = 21·0)%.

Caudal peduncle 16·0–20·0 (M = 18·0)% of standard length, 1·4–1·8 (modal range 1·5–1·6) times longer than deep.

Mouth inclined at an angle of 30–35° (rarely at 15–20°); posterior tip of the maxilla reaching a vertical slightly behind the anterior margin of the orbit or, less frequently, to a vertical through the anterior margin. The dentigerous arm of the premaxilla is somewhat expanded anteriorly in the midline, giving the bone a weakly beaked appearance; the dentary has a variously developed but obvious mental protuberance. Length of lower jaw 41·0–50·0 (M = 47·0)% of head length, 1·7–2·4 (modal range 2·2–2·3) times its width; jaws equal anteriorly.

Gill rakers. 9–11 (rarely 8) on the lower part of the first gill arch, the lower 1–4 rakers reduced, the next 3 or 4 generally slender, the uppermost rakers flattened and often bifid or anvil-shaped.

Scales. Ctenoid; lateral line with 31 (f.2), 32 (f.6), 33 (f.8) or 34 (f.1) scales in the 17 specimens with undamaged squamation, cheek with 3 or 4 rows. Five and a half to 6½ (rarely 5) scales between the lateral line and the dorsal fin origin, 5½ to 6½ (mode 6), rarely 7, between the pectoral and pelvic fins bases.

Fins. Dorsal with 23 (f.4), 24 (f.11) or 25 (f.5) rays, comprising 14 (f.1), 15 (f.14) or 16 (f.5) spines and 7 (f.1), 8 (f.2), 9 (f.16) or 10 (f.1) branched rays. Anal with 11 (f.8), 12 (f.11) or 13 (f.1) rays, comprising 3 spinous and 8 (f.8), 9 (f.10) or 10 (f.2) branched elements. Pectoral fin 26·0–33·0 (M = 30·0)% of standard length. Pelvic fins with the first branched ray produced in both sexes. Caudal truncate, scaled on its proximal third to half.

Teeth. In *both jaws* the *outer teeth* have relatively slender, near-cylindrical necks and somewhat compressed, gently recurved crowns. Three different types of crown form are present, viz. unicuspid, unequally bicuspid (sometimes weakly so) and tricuspid. It is difficult to detect any clear-cut spatially correlated arrangement of the different crown types within the outer series, or to show a definite preponderance of one type over the other. With few exceptions an admixture of all three types is present, usually with the tricuspids restricted to the posterior and posterolateral parts of the row in both jaws, and the bi- and unicuspids occurring anteriorly and anterolaterally. Not infrequently, unicuspids are found only in the upper jaw, and in 6 specimens no unicuspids are present in either jaw. Very rarely do tricuspid teeth predominate in an admixture of cusp types.

There are 70–80 (M = 74) teeth in the outer row of the upper jaw.

Teeth in the *inner series* are all small and tricuspid, implanted obliquely and arranged in 2 (rarely 1) rows in the upper jaw, and 1 or 2 (rarely 3) in the lower jaw.

Osteology. The *neurocranium* of *Haplochromis crocopeplus* (Fig. 3) closely resembles that found in other members of the *Haplochromis tridens* group (see Greenwood & Gee, 1969; Greenwood, 1974), although the supraoccipital crest is, relatively, a little higher, and the preorbital (i.e. ethmovomerine) region somewhat shorter in this species. In these features, the neurocranium of *H. crocopeplus* should be looked upon as representing a less specialized state than that seen in the neurocrania of the other species (see Greenwood, 1974; and below).

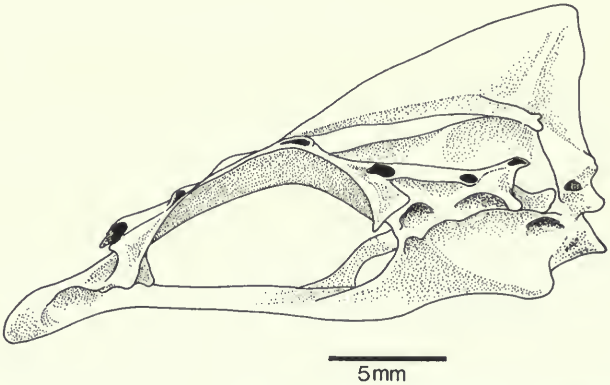

Fig. 3 *Haplochromis crocopeplus*. Neurocranium in left lateral view.

Each ramus of the *dentary* (Fig. 4) has a marked outwardly directed flare to its upper half, thus giving the lateral aspect of the bone a distinctly concave appearance (a feature best seen when the bone is viewed from the front). The concavity extends anteriorly almost to the symphysis.

The *premaxilla* has a moderately developed beak consequent upon the anterior and anterolateral expansion of its medial dentigerous surface; the pedicels (anterior ascending processes) are as long as the dentigerous arms of the bone.

The *lower pharyngeal bone* (Fig. 5) is narrow and slender, its dentigerous surface as broad as it is long (or slightly broader than long). The lower pharyngeal teeth are fine, compressed and cuspidate, and are arranged in 28–32 rows.

There are 28 (f.1), 29 (f.5), 30 (f.10) or 31 (f.1) *vertebrae* (excluding the fused PU_1 and U_1 centra) in the 17 specimens radiographed, the total comprising 12 (f.1), 13 (f.15) or 14 (f.1) abdominal and 15 (f.1), 16 (f.4) or 17 (f.12) caudal centra.

Coloration. In life a *sexually mature female* (BM(NH) reg. no. 1977.1.28:39; see Fig. 6) has the dorsum of the body and caudal peduncle grey with a yellow flush, that of the body becoming greyish-silver in the nape region. The flanks and ventral part of the caudal peduncle are ochrous becoming whitish on the belly. Traces of a very faint midlateral stripe are visible on the flanks. The dorsal surface of the head is yellowish-grey, the operculum ochrous yellow, the suboperculum somewhat silvery, the preorbital region and cheeks greyish-ochre (the latter becoming lighter ventrally) and the lips bright ochre. The branchiostegal membrane is yellowish-grey.

The dorsal fin is ochrous, with traces of red proximally, and hyaline spots distally on the soft part of the fin. The caudal is greyish-ochre proximally, yellowish distally; the anal fin is yellow with a grey margin, the pelvics are yellow, and the pectorals yellowish-hyaline.

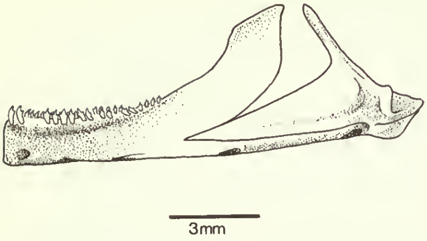

Fig. 4 *Haplochromis crocopeplus*. Left dentary and anguloarticular in lateral view.

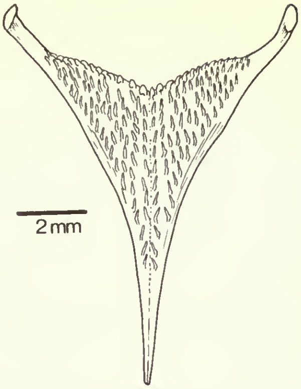

Fig. 5 *Haplochromis crocopeplus*. Lower pharyngeal bone in occlusal view.

An *adult but sexually quiescent male* (BM(NH) reg. no. 1977.1.28:38), see Fig. 7, has the dorsum of the body dark grey, the flanks, chest belly and caudal peduncle ochrous yellow; faint traces of a dark midlateral band are visible on the flanks. The head is yellowish grey, the opercular series grey.

The dorsal fin is grey-yellow with sooty lappets, the anal reddish anteriorly, pale grey-yellow posteriorly, its egg dummies (anal ocelli) yellow. The caudal fin is yellowish with dark rays and a red flush ventrally, the pectorals are hyaline with dark rays, and the pelvics sooty with an ochrous flush.

Preserved material. Adult males have a light brown ground coloration, darkest from the dorsum to about the level of the upper lateral line; in some specimens the ventral aspects of the body, and the entire caudal peduncle, are dusky or dusky overlying silver. Very faint indications of dark vertical bars are present on the flanks and caudal peduncle, the bars never extending as far as the dorsal body outline and sometimes not to the ventral outline either; in other specimens the bars merge with the dark coloration of the belly. The lower jaw and branchiostegal membrane are sooty, the vertical limb of the preoperculum dusky silver to black. The dorsal surface of the snout is dusky, and there is a very faint lachrymal stripe extending from the orbit to the lower jaw, passing immediately behind the posterior tip of the maxilla.

The dorsal fin is sooty-grey, the lappets black; the caudal is sooty, with the pigment most intense along its middle rays. The anal fin is light sooty, the pelvics black and the pectorals greyish.

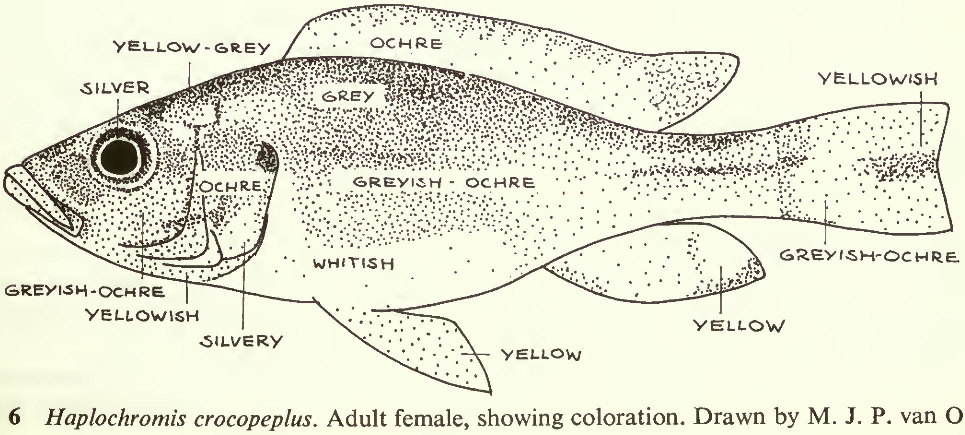

Fig. 6 *Haplochromis crocopeplus*. Adult female, showing coloration. Drawn by M. J. P. van Oijen

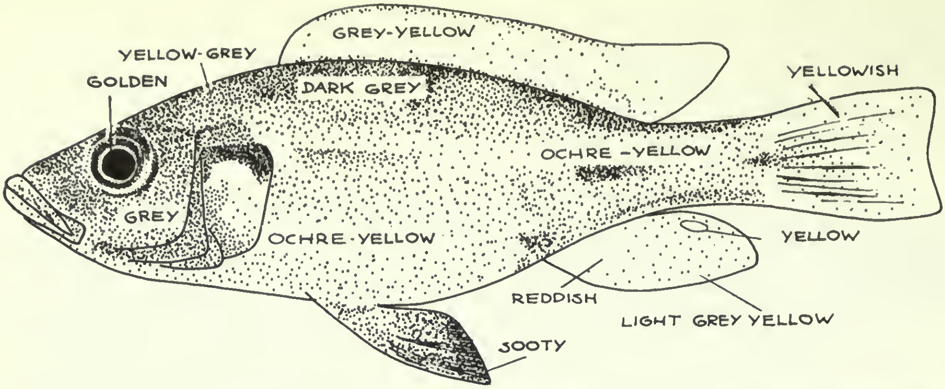

Fig. 7 *Haplochromis crocopeplus*. Adult male (sexually quiescent), showing coloration. Drawn by M. J. P. van Oijen.

Adult females have a light brown (almost fawn) ground coloration above the midlateral line, and are lighter fawn below. The dorsal aspects of the snout are faintly dusky, the operculum has a faint silvery sheen over its ventral half to two-thirds. No definite lachrymal stripe is visible, although in most specimens there is an ill-defined darkened region in the position of a typical lachrymal stripe.

The dorsal and caudal fins are greyish, the latter almost sooty between the middle few rays; the dorsal has black lappets. The anal and pelvic fins are hyaline, the pectorals greyish.

Ecology. *Habitat.* Most of the specimens of *H. crocopeplus* used in this description were caught in a trawl net shot northeast of Tefu Island in the Speke Gulf. The bottom there is of soft, mostly organic mud, and the water is *c.* 28 m deep. At least one other specimen (see p. 148) was caught at the entrance to the Mwanza Gulf (sandy bottom at 6 m).

Food. The entire alimentary tract of all 17 specimens examined was filled with an organic sludge composed mainly of partly decomposed blue-green algae, and diatom frustules. Since such decaying organic matter is typical of the mud–water interface in Lake Victoria, we suspect that the gut contents of these fishes do not, in fact, represent normal food intake. Rather, we consider it more likely that the captive fishes ingested large quantities of the light, flocculent mud through which the net was moving.

The intestine of *H. crocopeplus*, however, is relatively long (*c.* 2·3–2·5 times the standard length) with the greater part coiled. Such a gut morphotype is often associated with a diet of detrital matter and differs from that found in the previously described and essentially carnivorous species of the '*tridens*' group (see Greenwood & Gee, 1969).

Breeding. No information is available on the reproductive habits of *H. crocopeplus*. Only one of the 17 specimens examined is definitely immature, a female 76·5 mm S.L. A male of 71·0 mm S.L. is adult and, apparently, sexually active. There is considerable variation in the extent to which the two ovaries are developed in sexually active fishes; in some, both ovaries are of equal size, in others the left ovary is so greatly reduced (the modal condition) as to appear non-functional, while in others it is only slightly reduced. (See also Greenwood & Gee, 1969 : 38, 43, 47 & 51.)

Judging from the sample available to us, males and females reach the same maximum adult size.

Diagnosis and affinities. *Haplochromis crocopeplus* shows all the diagnostic features of an *H. tridens*-group member (see Greenwood & Gee, 1969; and p. 155 below). In addition to inter-specific differences in live coloration, *H. crocopeplus* can be distinguished from other species of that group as follows:

(i) From *Haplochromis tridens* (see Greenwood, 1967 : 97, fig. 20) by its less steeply sloping dorsal head profile (30–35°, cf. 40–45°), slightly wider interorbital distance (18·0–22·0, M = 19·5%

head, cf. 15·0–19·5, M = 16·7%), more numerous teeth in the outer premaxillary series (74 cf. 66), more oblique mouth (30–35°, cf. horizontal to 10°) and its less elliptical eye.

(ii) From *Haplochromis dolichorhynchus* (see Greenwood & Gee, 1969 : 34, fig. 21) by the slightly steeper slope of its dorsal head profile (30–35°, cf. 20–30°), its shorter snout (29·0–31·0, M=30·0% of head, cf. 30·3–38·0, M=34·2%), slightly larger eye (28·0–33·0, M=30·0% head, cf. 25·9–29·6, M=27·2%), somewhat more oblique mouth (30–35°, cf. 15–25°), greater posterior extension of the maxilla and by the less marked beak-like expansion of the premaxilla.

(iii) From *Haplochromis chlorochrous* (see Greenwood & Gee, 1969 : 44, fig. 27) by its slightly longer head (34·0–38·0, M=36·0% of standard length, cf. 32·0–35·4, M=34·0%), very slightly shorter snout (29·0–31·0, M=30·0% head, cf. 29·5–35·0, M=32·3% head) and slightly larger eye (28·0–33·0, M=30·0% head, cf. 25·4–29·0, M=28·2%).

Both species have similarly oblique mouths and similar dorsal profiles. A minor osteological difference lies in the more concave lateral aspect of the dentary in *H. crocopeplus* (see Greenwood & Gee, 1969 : 46; and p. 144 above). *Haplochromis crocopeplus* appears to have fewer unicuspid and more bi- and tricuspid teeth in its outer tooth rows, especially that of the upper jaw, but this may be a size correlated feature since many specimens in the *H. chlorochrous* sample examined are larger than the available specimens of *H. crocopeplus*. In life, adult male coloration seems to distinguish immediately between the two species.

(iv) From *Haplochromis tyrianthinus* (see Greenwood & Gee, 1969 : 40, fig. 25) by its slightly deeper body (29·0–35·0, M=33·0% standard length cf. 27·3–32·6, M=30·6%), straight dorsal head profile (albeit one sloping at a similar angle), somewhat wider interorbital space (18·0–22·0, M=19·5% head, cf. 15·2–18·3, M=17·4%) larger eye (28·0–33·0, M=30·0% head, cf. 26·1–29·3, M=27·7%), and more oblique mouth (30–35° cf. 15–20°).

(v) From *Haplochromis cryptogramma* (see Greenwood & Gee, 1969 : 48, fig. 30) by the distinctive colour pattern of that species, which is retained even in preserved material, and also by the noticeably concave dorsal head profile in *H. cryptogramma*, by the slightly narrower interorbital width in *H. crocopeplus* (18·0–22·0, M=19·5% head, cf. 20·3–23·9, M=22·0%), by its slightly shorter snout (29·0–31·0, M=30·0% head, cf. 28·6–35·5, M=33·0%), deeper cheek (17·0–25·0, M=21·0% head, cf. 15·8–21·5, M=19·0%) slightly larger and more elliptical eye (28·0–33·0, M=30·0% head, cf. 25·8–31·6, M=28·7%), more steeply inclined mouth (30–35°, cf. 10–15°) and the greater number of teeth in the outer premaxillary row (70–80, M=74, cf. 50–78, M=68).

(vi) From *Haplochromis sulphureus* (see below, p. 148, Fig. 8), a species which it closely resembles in most morphometric features, by differences in head shape, especially its more steeply inclined mouth (30–35°, cf. 10–15°), its larger scales between the dorsal fin origin and the lateral line (5½–6, cf. 6–7½, mode 7) and its larger chest scales (5½–7, mode 6, cf. 7–8, mode 8, scales between the pectoral and pelvic fin bases).

The two species also differ in live coloration and in their habitats, with *H. sulphureus* apparently confined to deeper water (see p. 150 below).

(vii) From *Haplochromis plutonius* (see p. 151 and Fig. 11 below) by its slightly longer snout (29·0–31·0, M=30·0% head, cf. 27·0–30·0, M=29·0%) and lower jaw (41·0–50·0, M=47·0% head, cf. 41·0–46·0, M=44·0%). The two species differ markedly in the live colours of adult males (cf. pp. 144 and 153), a difference that is also reflected in the darker coloration of preserved specimens.

Little can be said about the phyletic relationships of *H. crocopeplus* within the '*tridens*' species complex, except to note that its overall neurocranial morphology (see p. 144) suggests a less derived condition than that of the other species (remembering, of course, that the cranial osteology of *H. plutonius* is still unknown; see p. 153), as does the relatively slight beak on the premaxilla (see p. 144). The well-developed flare on the dentary (p. 144), however, is probably a derived condition and one shared with at least 5 species of the group (*viz. H. cryptogramma, H. dolichorhynchus, H. tridens* and *H. sulphureus*.

STUDY MATERIAL AND DISTRIBUTION RECORDS

Museum and Reg. No.	Locality	Collector
	TANZANIA	
BM(NH) 1977.1.10:70 (Holotype)	Speke Gulf, between Nafuba and Tefu Islands (28 m, mud)	Anker & Barel
BM(NH) 1977.1.10:71–87 (Paratypes)	Speke Gulf, between Nafuba and Tefu Islands (28 m, mud)	Anker & Barel
BM(NH) 1977.1.18:38 (Paratype)	Entrance of Mwanza Gulf (14m, sand)	Anker & Barel
BM(NH) 1977.1.28:39 (Paratype)	Speke Gulf, N.E. of Tefu Island (28 m, mud)	Anker & Barel

Haplochromis sulphureus sp. nov.

HOLOTYPE. An adult and sexually active male, 97·0 mm S.L., trawled over a mud bottom at a depth of *c.* 57 m in Ugandan waters at 0°45′ S, 32°38′ E. BM(NH) reg. no. 1977.1.10:106.

The trivial name (from the Latin) refers to the sulphur-yellow adult coloration in both sexes.

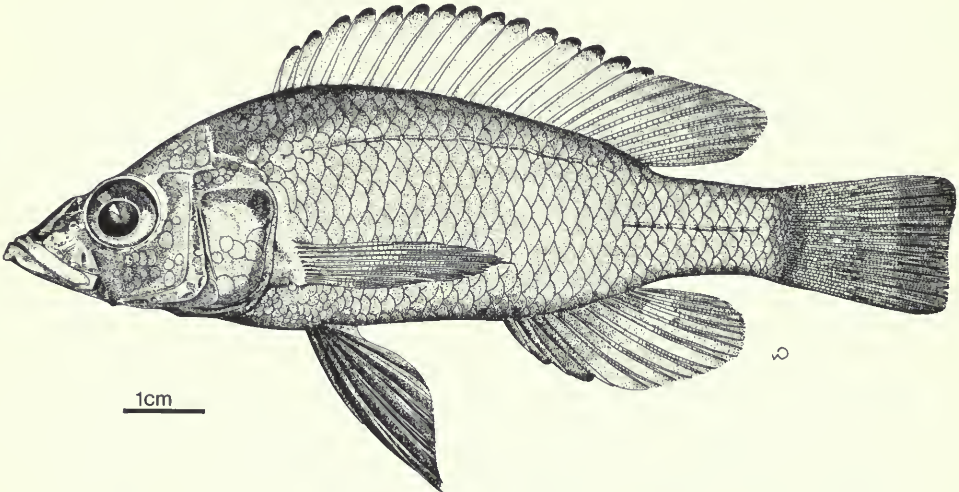

Fig. 8 *Haplochromis sulphureus.* Holotype. Drawn by M. J. P. van Oijen.

DESCRIPTION (Figs 8–10). Based on 22 specimens (including the holotype), 90·0–109·0 mm S.L.

Depth of body 29·0–35·0 (M = 32·5) % of standard length, length of head 33·0–37·0 (M = 35·0) %.

Dorsal head profile straight or slightly decurved, sloping at an angle of 30–35°; cephalic lateral line pores prominent, the pores and tubules of the preorbital bone especially so.

Preorbital depth 13·0–18·0 (M = 15·0) % of head, least interorbital width 16·0–19·0 (M = 17·0) %. Snout as long as broad to slightly longer than broad (1·1 times), its length 29·0–33·0 (M = 31·0) % of head. Orbit and eye slightly elliptical, the eye with a narrow but definite anterior and anteroventral aphakic aperture; eye diameter 28·0–33·0 (M = 31·0) % of head. Depth of cheek 18·0–21·0 (M = 19·0) %.

Caudal peduncle 15·0–20·0 (M = 18·0) % of standard length, 1·3–1·8 (modal range 1·5–1·6) times longer than deep.

Mouth inclined at an angle of 10–15°, the posterior tip of the maxilla reaching a vertical through the anterior orbital margin or slightly beyond that level; lower jaw projecting beyond the upper anteriorly. Premaxilla with a moderately to well-developed antero-medial expansion of its dentigerous arm, giving the bone a distinctly beaked appearance; the dentary has a prominent mental protuberance. Length of lower jaw 44·0–50·0 (M = 47·0) % of head, 1·8–2·6 (modal range 2·0–2·3) times its width.

Gill rakers. 9 or 10 on the lower part of the first gill arch, the lower 1–3 rakers reduced, the next 2 or 3 relatively slender, and the remainder flattened and branched, often anvil-shaped.

Scales. Ctenoid; lateral line with 32 (f.4), 33 (f.11), 34 (f.4) or 35 (f.2) scales. Cheek with 3 (mode) or 4 rows. Six and a half (mode) or 7 scales between the lateral line and the dorsal fin origin, 7–8 between the pectoral and pelvic fin bases.

Fins. Dorsal with 23 (f.3), 24 (f.12) or 25 (f.7) rays, comprising 15 (f.17) or 16 (f.5) spines and 8 (f.4), 9 (f.15) or 10 (f.3) branched rays. Anal with 10 (f.1), 11 (f.14) or 12 (f.7) rays, comprising 3 spines and 7 (f.1), 8 (f.14) or 9 (f.7) branched rays. Pectoral fin 25·5–31·0 (M = 29·0) % of standard length. Pelvic fins with the first branched ray produced in both sexes. Caudal truncate, scaled on its proximal third (rarely) to half.

Teeth. The *outer row* in *both jaws* commonly has an admixture of bicuspid (some weakly so), unicuspid and tricuspid teeth; in a few specimens no tricuspids are present, and in others unicuspids are absent. Tricuspid teeth are generally confined to the lateral and posterior parts of the tooth row, with only bi- and unicuspids occurring anteriorly. Irrespective of cusp type, the teeth have compressed and slightly recurved crowns, and near-cylindrical necks.

There are 70–82 (M = 76) teeth in the outer row of the upper jaw.

Teeth in the *inner rows* of *both jaws* are small, tricuspid, compressed and somewhat obliquely implanted; those of the upper jaw are arranged in 2 (mode) or 3 series, and those of the lower jaw in 1 or 2 (mode) series.

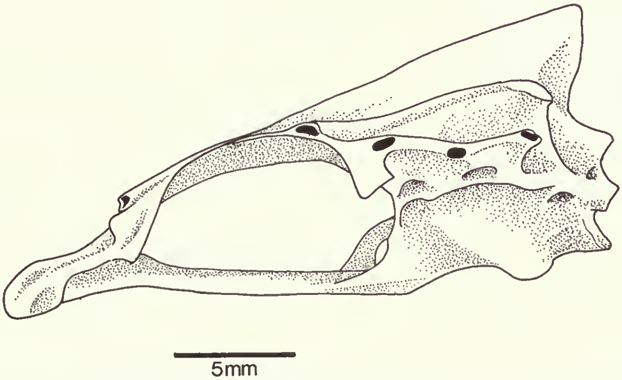

Fig. 9 *Haplochromis sulphureus.* Neurocranium in left lateral view.

Osteology. The neurocranium (Fig. 9) is of the typical '*tridens*'-group type, with a low supraoccipital crest and a relatively protracted preorbital (ethmovomerine) face.

The lateral face of the *dentary* is markedly flared, the resulting concavity extending forward to the symphysial area, the lower part of which is produced into a noticeable mental process.

The *premaxilla* is moderately beaked and its ascending processes (pedicels) are a little shorter than the dentigerous arms.

The *lower pharyngeal bone* (Fig. 10) is slender, with a narrow dentigerous surface that is slightly broader than long. When compared with the lower pharyngeal bone in other members of the '*tridens*' group, that of *H. sulphureus* appears to be relatively broader. The *lower pharyngeal teeth* are slender, compressed and cuspidate, and are arranged in from 28 to 30 rows.

There are 30 vertebrae (excluding the fused PU_1 and U_1 centra), comprising 13 abdominal and 17 caudal elements, in the 11 specimens radiographed.

Coloration. In life only slight differences exist between the colours of adult males and females, although it must be remembered that information on live coloration was obtained from fishes that had been in a trawl net for as long as half an hour before they were examined.

The ground colour is a bright sulphur yellow, shading to silvery-white on the belly, and darkening to near olivaceous on the dorsum and upper flanks. In most *males* the chest, belly, lower jaw and branchiostegal membrane are sooty.

The dorsal and caudal fins are a deep yellow, the former with black lappets and a black margin to the soft part of the fin. In *females* the anal and pelvic fins are also deep yellow, but in *males* the anal has a sooty overlay and the pelvics are black. The anal ocelli (egg dummies) of males are yolk-yellow in colour.

Preserved coloration. Adult males have a uniformly bright yellow-brown ground coloration except for some individuals in which the chest and belly are darker and may even be sooty. No trace of vertical or horizontal bars is visible on the body in most specimens but a few do show either extremely faint traces of 4 or 5 vertical bars on the flanks, or a faint, interrupted dark midlateral stripe.

The dorsal aspect of the snout is a very dark brown, as is the lower jaw and the vertical limb of the preoperculum. There is no distinct lachrymal bar, although that region of the cheek and snout shows a diffuse darkening. The branchiostegal membrane is sooty in most fishes but is a very light yellowish-brown in others; this feature, like the sooty chest and belly, is probably correlated with the degree of sexual activity.

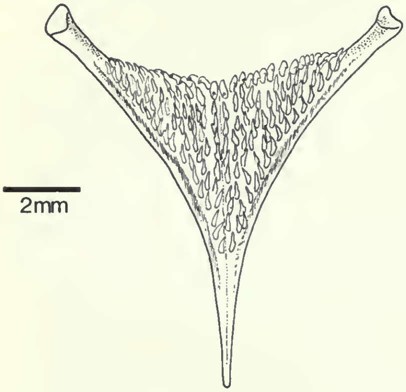

Fig. 10 *Haplochromis sulphureus.* Lower pharyngeal bone in occlusal view.

The dorsal and caudal fins are greyish-yellow, the lappets of the former are black; the anal fin is yellowish-brown (lighter than the body) but with a sooty overlay in some individuals, the colour intensifying to fully black over the spinous part of the fin. Pelvic fins sooty to black, the intensity being directly correlated with the degree of darkening manifest on the ventral aspects of the body. Pectoral fins are yellowish-hyaline.

Adult females are almost uniformly light yellowish-brown, but are slightly darker on the dorsum and much darker on the dorsal aspects of the snout. A very faint and narrow midlateral stripe is present on at least the posterior third of the body, and may extend further anteriorly.

The dorsal and caudal fins are greyish-yellow, the lappets of the dorsal black. The anal and pelvic fins are yellow, and the pectorals greyish-yellow.

ECOLOGY. *Habitat.* The five stations from which *H. sulphureus* were obtained are in the northern part of Lake Victoria (0°38′–0°50′ S); the water is from *c.* 16–20 m deep, and the bottom of soft mud.

FOOD. Of the 15 specimens examined, two contained unidentifiable sludge, one the remains of dipteran pupae and some fragments of unidentifiable crustaceans, one the remains of dipteran larvae and some fragmentary crustacean remains, another the remains of both dipteran larvae and pupae, and two only fragments of unidentifiable crustaceans.

BREEDING. No information is available on the reproductive habits of *H. sulphureus.* All the 22 specimens available are adult and most are sexually active; females appear to reach a larger adult size than do males. Sexually active females may have the left ovary much better developed and larger than the right one (the usual condition), the ovaries may be of equal size or, as in one fish, the right ovary may be larger than the left one.

DIAGNOSIS AND AFFINITIES. In addition to interspecific differences in its adult male coloration, *H. sulphureus* can be distinguished from other members of the '*tridens*' group as follows:

(i) From *H. tridens* (see Greenwood, 1967 : 97, fig. 20) by its less steeply sloping dorsal head profile (30–35°, cf. 40–45°), shallower preorbital (13·0–18·0, M=15·0% head, cf. 16·0–21·0, M=17·0%), smaller scales between pectoral and pelvic fin bases (7–8 cf. 5–6½ (mode)) and by its stouter lower jaw.

(ii) From *H. dolichorhynchus* (see Greenwood & Gee, 1969 : 34, fig. 21) by its more obviously elliptical eye, the absence in preserved female specimens of a distinct midlateral stripe, and by the smaller scales between the dorsal fin origin and the lateral line (6–7½, mode 7, cf. 5–6½, mode 5½). Although there is considerable interspecific overlap in all morphometric characters, the mean values of certain features in *H. sulphureus* indicate that this species does have a deeper caudal peduncle, a deeper preorbital, a larger eye and a shorter snout. (The means for the three latter characters, expressed as a percentage of head length, are: 15·0 cf. 18·0, 31·0 cf. 27·0 and 31·0 cf. 34·0 respectively).

(iii) From *H. chlorochrous* (see Greenwood & Gee, 1969 : 44, fig. 27) by its less oblique mouth (10–15°, mode 10°, cf. 20–35°, mode 30°), less prominent premaxillary pedicels, smaller scales between the dorsal fin origin and the lateral line (6–7½, mode 7, cf. 5½–6½, mode 6), shallower cheek (18·0–21·0, M=19·0% head, cf. 20·0–25·0, M=22·6%) and larger eye (28·0–33·0, M=31·0% head, cf. 25·4–29·0, M=28·2%).

(iv) From *H. tyrianthinus* (see Greenwood & Gee, 1969 : 40, fig. 25) by its less decurved dorsal head profile, smaller scales between the dorsal fin origin and the lateral line (6–7½, mode 7, cf. 5–6, mode 5½), shallower cheek (18·0–21·0, M=19·0% head, cf. 20·0–25·3, M=22·9%) and its larger eye (28·0–33·0, M=31·0% head, cf. 26·1–29·3, M=27·7%).

(v) From *H. cryptogramma* (see Greenwood & Gee, 1969 : 48, fig. 30) by the absence of distinctive midlateral markings of blotches and bands, by its much less prominent premaxillary pedicels, a convex or straight dorsal head profile (cf. a markedly concave one), an elliptical orbit, smaller scales between the dorsal fin origin and the lateral line (6–7½, mode 7, cf. 5–6½, mode 5½), and a narrower interorbital width (16·0–19·0, M=17·0% head, cf. 20·3–23·9 M=22·0%).

For features distinguishing *H. sulphureus* from *H. crocopeplus* and *H. plutonius* see pp. 147 and 155 for the species respectively.

The phyletic relationships of *H. sulphureus* within the *H. tridens* lineage as currently conceived cannot be determined precisely; there are some indications (especially from its coloration) that the species may be most closely related to *H. crocopeplus*.

STUDY MATERIAL AND DISTRIBUTION RECORDS

Museum and Reg. No.	Locality	Collector
	UGANDA	
BM(NH) 1977.1.10:106 (Holotype)	0°45′ S, 32°38′ E	P. H. Greenwood
BM(NH) 1977.1.10:107–108 (Paratypes)	0°44′ S, 32°30′ E	P. H. Greenwood
BM(NH) 1977.1.10:109–116 (Paratypes)	0°50′ S, 32°35′ E	P. H. Greenwood
BM(NH) 1977.1.10:117–121 (Paratypes)	0°39′ S, 32°35′ E	P. H. Greenwood

Haplochromis plutonius sp. nov.

HOLOTYPE. An adult male, 93·0 mm S.L., from a trawl made over a mud bottom in water *c.* 28 m deep, between Nafuba and Tefu Islands, Speke Gulf. BM(NH) reg. no. 1977.1.10:39.

The trivial name (from the Latin) refers to the dusky preserved coloration of adult males.

DESCRIPTION (Figs 11–13). Based on 10 specimens (including the holotype) 75·0–96·0 mm S.L.

Depth of body 29·0–33·0 (M=31·0)% of standard length, length of head 34·0–37·0 (M=35·0)%.

Dorsal profile of head straight to a point above the preoperculum, then gently decurved, sloping at an angle of *c.* 30°, the premaxillary pedicels are prominent. The cephalic lateral line pores are enlarged, the pores and tubules of the preorbital bone and dentary being especially obvious.

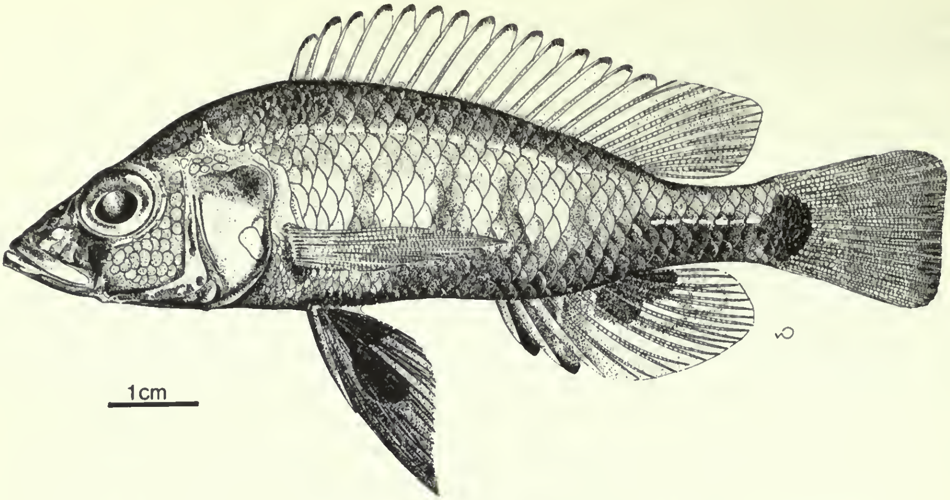

Fig. 11 *Haplochromis plutonius.* Holotype. Drawn by M. J. P. van Oijen.

Preorbital depth 15·0–17·0 (M = 16·0) % of head, least interorbital width 15·0–18·0 (M = 16·0) %. Snout as long as broad or very slightly longer than broad (1·1 times), its length 27·0–30·0 (M = 29·0) % of head. Eye and orbit distinctly elliptical, the eye with a well-developed anterior and anteroventral aphakic aperture; greatest diameter of eye 31·0–33·0 (M = 32·0) % of head. Cheek depth 16·0–21·0 (M = 19·0) %.

Caudal peduncle 1·4–1·8 (mode 1·6) times longer than deep, its length 16·0–19·0 (M = 18·0) % of standard length.

Mouth inclined at an angle of 10–15°; posterior tip of the maxilla reaching a vertical through the anterior margin of the eye or slightly beyond that level. Premaxilla with a moderately developed beak. Lower jaw projecting slightly beyond the upper, and with a moderately developed mental protuberance; length of lower jaw 41·0–46·0 (M = 44·0) % of head, 1·9–2·4 (modal range 2·0–2·1) times greater than its width.

Gill rakers. 8–10 (mode) on the lower part of the first gill arch, the lowermost 1–3 rakers reduced, the uppermost 3 or 4 flattened and usually anvil-shaped, the remaining rakers simple and moderately slender.

Scales. Ctenoid; lateral line with 32 (f.1), 33 (f.7) or 35 (f.1) scales, cheek with 3 or 4 rows. Five and a half to 7 (modal range 6–7) scales between the lateral line and the dorsal fin origin, 6–7 between the pelvic and pectoral fin bases.

Fins. Dorsal fin with 24 (f.9) or 25 (f.1) rays, comprising 15 (f.9) or 16 (f.1) spinous and 9 (f.9) or 10 (f.1) branched elements, anal with 11 (f.4) or 12 (f.6) rays, comprising 3 spines and 8 (f.4) or 9 (f.6) branched rays. Pectoral fin 26·0–30·0 (M = 29·0) % of standard length. Pelvics with the first branched ray moderately produced in both sexes. Caudal truncate, scaled on its basal half in most specimens, but not quite so extensively in a few others (only on the proximal third in one fish).

Teeth. The *outer row* in *both jaws* contains an admixture of bi- and tricuspid teeth; the teeth, irrespective of cusp shape, have compressed and slightly recurved crowns, and near-cylindrical necks. In most specimens the bicuspid teeth are situated anteriorly in the jaws, the lateral and posterolateral teeth being either all tricuspid or a mixture of tri- and bicuspids in which the tricuspids predominate. The exceptional individuals have a mixture of bi- and tricuspids anteriorly (the latter type predominating), although one specimen has only bicuspids in the outer row of both jaws.

There are 66–78 (modal range 70–74) teeth in the outer row of the upper jaw.

The *inner teeth* of *both jaws* are invariably small and tricuspid, are implanted obliquely and are arranged in 1 or 2 (mode) rows.

Osteology. Because so few specimens of *H. plutonius* are available, no complete skeleton has been prepared. Superficial dissection shows that the dentigerous surface of the *premaxilla* is moderately expanded medially, giving the bone a fairly definite beaked appearance. The dentigerous surface of the *dentary* is flared outward so that the lateral face of the bone is distinctly concave, with the concavity extending to the symphysial region of the bone.

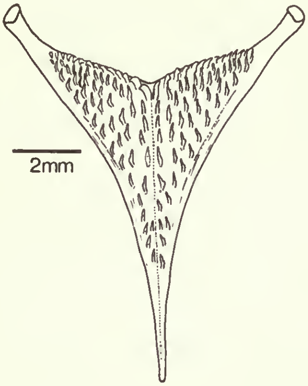

Fig. 12 *Haplochromis plutonius*. Lower pharyngeal bone in occlusal view.

The *lower pharyngeal bone* is noticeably narrow, slender and elongate (see Fig. 12); its dentigerous surface is either as broad as it is long or it may be slightly longer than broad. The *lower pharyngeal teeth* are fine, compressed and cuspidate, and are arranged in about 24 rows.

There are 29 (f.1), 30 (f.7) or 31 (f.1) vertebrae (excluding the fused PU_1 and U_1 centra) comprising 12 (f.1) or 13 (f.8) abdominal and 17 (f.8) and 18 (f.1) caudal elements.

Coloration. In *life* an *adult, sexually active male* (BM(NH) 1977.1.10:39) (see Fig. 13) has a purple ground coloration, with the ventral aspect of the flanks yellowish-grey, the chest and belly are dark grey to black, and the ventral part of the caudal peduncle a very dark grey. The head is purple except for a whitish opercular region, and a pinkish colour on the anterodorsal angle of the operculum and ventral preopercular limb; the branchiostegal membrane in sooty.

There is a faint lachrymal stripe, and three faint vertical bars on the flanks.

The dorsal fin is hyaline, with a grey base and broad, bright red streaks; the lappets are dark grey.

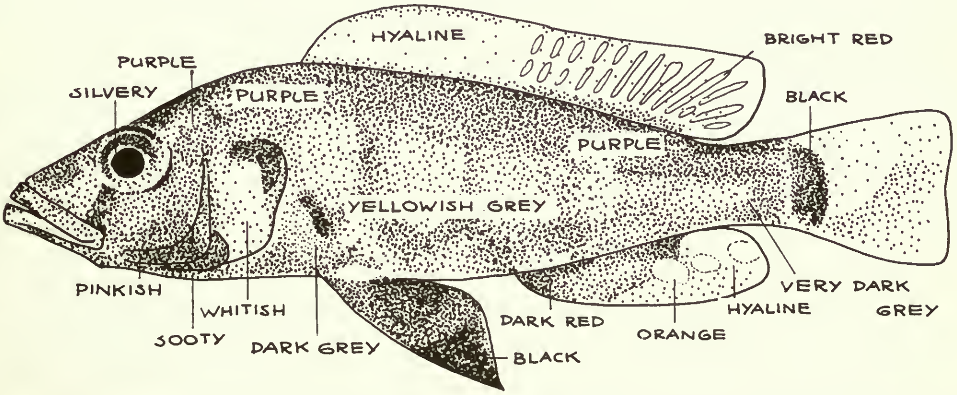

Fig. 13 *Haplochromis plutonius*. Adult male (sexually active), to show coloration. Drawn by M. J. P. van Oijen.

The anal fin has a red flush, becoming most intense on the anterior part of the fin (which may even appear to be black); the egg dummies are orange. The pelvic fins are black, the pectorals hyaline. The caudal fin is black basally, the dorsal half yellowish anteriorly but overlain by a red flush which intensifies over the ventral half of the fin.

The colours of *live females* are unknown.

Preserved coloration. Adult males. The dorsum and upper two-thirds of the flanks are dark brown, the belly and ventral aspects of the flanks dusky to sooty with a silvery-grey underlay. At least 4, sometimes 5 or 6, dark bars cross the flanks and merge with the darker ventral body colour (which is less intense than that of the bars); dorsally, the bars extend only to a level about two scale rows below the upper lateral line scale row. In some specimens there are very faint indications of an interrupted midlateral band, especially on the posterior part of the body.

The dorsal surface of the snout is a very dark brown (almost black); the branchiostegal membrane and the vertical limb of the preoperculum are black, the cheek brownish over silver, the operculum silver with a diffuse dusky overlay. A fairly distinct lachrymal stripe, of variable intensity, runs almost vertically, or with a slight anterior inclination, from the lower orbital margin to merge with the dark pigmentation of the lower jaw.

The dorsal fin is greyish to dusky, the lappets black and the soft part of the fin with dark spots and streaks between its rays. The caudal is dusky, darkest along its middle; the anal too is dusky, but with a black basal band and black pigment between the spines. The pelvic fins are black, and the pectorals faintly greyish.

Adult females. The dorsum is light brown, the remainder of the body silvery white; there are faint indications of a narrow midlateral stripe, most clearly discernible on the posterior half of the body.

The dorsal surface of the snout is very dark brown, the operculum is silvery and, save for a dark blotch anteroventrally to the orbit, there is no lachrymal stripe.

The dorsal and caudal fins are faintly sooty, the anal and pelvics hyaline, and the pectorals a faint grey.

ECOLOGY. *Habitat.* The species is known only from one locality in the Speke Gulf; the bottom is mud and the depth about 28 m. It is presumed that the specimens were caught while the trawl was fishing on the bottom.

FOOD. All 9 fishes examined had the entire alimentary tract filled with flocculent organic debris (decomposing blue-green algae). Since this type of material is typical of the mud-water interface we suspect that it was ingested while the specimens were caught in the trawl (see also pp. 146 & 168), and thus that it may not represent the natural food of *H. plutonius.*

The intestine of *H. plutonius* is relatively long (2 times standard length) and much coiled, suggesting that a certain amount of plant material may be part of the normal diet.

BREEDING. No information is available on the breeding habits of *H. plutonius.* All the 10 specimens examined were adult and sexually active. Of the two females represented in the sample, one has both ovaries equally developed, the other has only the right ovary enlarged.

DIAGNOSIS AND AFFINITIES. From *H. dolichorhynchus*, *H. tyrianthinus*, *H. chlorochrous* and *H. cryptogramma*, *Haplochromis plutonius* is differentiated by, amongst other features, its larger eye (31·0–33·0, M=32% head) and shorter snout (27·0–30·0, M=29·0% head); from *H. cryptogramma* it is also distinguished by the absence of a conspicuous broad and interrupted midlateral stripe, and by its straight, as opposed to markedly concave, dorsal head profile.

From *H. tridens*, *H. plutonius* is differentiated by its shorter lower jaw (41·0–46·0, M=44·0% head, cf. 43·3–51·8, M=47·5%), its less steeply sloping but more concave dorsal head profile (*c.* 30° cf. 40–45°) and its slightly shallower body (29·0–33·0, M=31·0% standard length, cf. 30·1–36·2, M=33·5%). The preserved coloration of the two species also differs. When males with testes in a morphologically similar state of development (presumably sexually active) are compared, *H. tridens* lacks the dark pigmentation of *H. plutonius* (*H. tridens* are silvery, with black pelvic fins).

From *H. crocopeplus*, *H. plutonius* differs in the live coloration of its males and by having a slightly shorter lower jaw (41·0–46·0, M=44·0% head, cf. 41·0–50·0, M=47·0%) and less oblique mouth (10–15°, cf. 30–35°, mode 35°).

From *H. sulphureus*, *H. plutonius* differs in its somewhat shorter snout (27·0–30·0, M=29·0% head, cf. 29·0–33·0, M=31·0%) and lower jaw (41·0–46·0, M=44·0% head, cf. 44·0–50·0, M=47·0%); live adult male coloration is also diagnostic.

The phyletic affinities of *H. plutonius* within the '*tridens*'-group cannot yet be determined.

STUDY MATERIAL AND DISTRIBUTION RECORDS

Museum and Reg. No.	Locality	Collector
	TANZANIA	
BM(NH) 1977.1.10:39 (Holotype)	Speke Gulf, N.E. of Tefu Island	Anker & Barel
BM(NH) 1977.1.10:40–48 (Paratypes)	Speke Gulf, N.E. of Tefu Island	Anker & Barel

Comments on the *Haplochromis tridens* species complex

The addition of three further species to this complex, now totalling 8 species, enables one to give a more precise definition of the lineage than hithertofore, and to review its phyletic relationships (see Greenwood, 1974 for a preliminary analysis).

One of the most diagnostic group features is, of course, the presence of several to many tricuspid teeth in the outer row of at least one and usually both jaws, these teeth not being confined to an extreme posterior position in the row. The tricuspids are sufficiently numerous, and of a size comparable with their bi- and unicuspid congeners, to exclude the possibility of their merely being teeth from the inner series that have moved outwards to fill the gaps caused by the loss of true outer row teeth.

In other Lake Victoria *Haplochromis* species a few tricuspid teeth may occur posteriorly in the outer series of the lower jaw or, less commonly, posteriorly in the upper jaw. These tricuspids are never as numerous as those in members of the '*tridens*' group, and when they occur in the lower jaw are noticeably smaller than the teeth situated laterally and anteriorly. Often the tricuspids are clearly displaced elements of the inner tooth series. Very occasionally one or two tricuspid teeth are found elsewhere in the outer rows of non-'*tridens*'-group *Haplochromis* species, but as mentioned above, these are never so numerous as are the tricuspids in '*tridens*' species.

The tricuspid outer teeth in members of the '*tridens*'-group can be considered a derived (and autapomorph) feature, although their functional significance (if any) remains unknown.

Other apomorph, but not necessarily autapomorph features shared by all members of the group are apparent in the skeleton.

The skull has slender proportions, with a low otico-occipital (brain case) region, low supraoccipital crest, and a relatively elongate ethmovomerine region, all of which give the neurocranium a characteristic appearance (see Figs 3 & 9 above, and relevant figures in Greenwood, 1974).

The preorbital bone has greatly enlarged lateral line canals and pores (Fig. 8) and, especially characteristic, a large, nearly rectangular bullation occupying almost the entire anterior portion of the bone between its margin and the first lateral line tubule. Apparently this outpocketing is associated with the relatively enlarged dorsal articular head of the maxilla, which it overlies. Enlarged preorbital lateral line tubules are, of course, found in many *Haplochromis* species, especially those inhabiting deeper or turbid waters, but the extensive preorbital bulla seems to be an autapomorphic feature of the '*tridens*'-group. (Some species belonging to other groups, e.g. *Haplochromis nanoserranus* of the *Haplochromis serranus* lineage, see p. 158 below, also have an anterior bullation of the preorbital. However, it is always relatively smaller, appears more circumscribed and is approximately circular in outline.)

The dentary in '*tridens*'-group species has a very characteristic shape (Fig. 4), low and slender but with the coronoid region rising steeply to meet the deep anguloarticular bone.

All members of the group have a narrow and slender lower pharyngeal bone (Fig. 5) with an elongate anterior blade and numerous fine, compressed and cuspidate teeth.

Ecologically, the '*tridens*' species appear to be members of the sublittoral to benthic community, the greater number of species occurring in water between 15 and 30 m deep. No clear picture has emerged yet of their feeding habits. Some species feed on pre-adult insects (especially Diptera) and adult crustaceans (see Greenwood, 1967; Greenwood & Gee, 1969; Greenwood, 1974), while others may be detritus feeders (see pp. 146 & 154 above); certain of these latter species have a relatively elongate and much coiled intestine, anatomical features often associated with that type of diet and feeding habit.

No member of the group can be considered to reach a large adult size, a standard length of 120 mm being the largest so far recorded (for *H. chlorochrous*, see Greenwood & Gee, 1969). Because of their habitat preferences and their small adult size, species of the '*tridens*' group have only been caught in small-mesh trawl nets; to the best of our knowledge none has been recorded from the catches of beach-operated seine nets or from commercially-operated set-nets.

On the basis of various derived characters shared by all known species of the '*tridens*' complex, a strong argument can be put forward for considering the group as a monophyletic assemblage within the Lake Victoria species flock. Some anatomical features (neurocranial morphology in particular) indicate close affinity with the *H. serranus* and *Haplochromis prognathus* lineages, probably as the sister group of the two latter lineages combined (see Greenwood, 1974). In his preliminary phyletic analysis of the Lake Victoria *Haplochromis* species, Greenwood (1974) also suggested the existence of a relationship between, on the one hand, the '*tridens*' group plus the lepidophagous *Haplochromis welcommei*, and on the other hand, the insectivorous–molluscivorous lineage comprising *Haplochromis riponianus*, *H. saxicola* and *H. aelocephalus* (the three lineages together forming the sister group to the combined *H. serranus* and *H. prognathus* lineages).

For the moment no further comments can be made about possible relationships between *H. welcommei* and the '*tridens*' group. However, taking into account relative specializations seen in the neurocranium of '*tridens*' species when compared with the less specialized neurocranial form of the *H. riponianus* group, and also taking into account the autapomorph features of the two groups (see Greenwood, 1974), an argument could be made against their having a recent common ancestry (but not against the *H. riponianus* group sharing more distant ancestry with both the '*tridens*' group and the *H. serranus–H. prognathus* group). In other words, the '*tridens*' group may share a more recent common ancestry with the *H. serranus–H. prognathus* lineage than with the *H. riponianus–H. aelocephalus* one.

Basically, neurocranial form in the '*tridens*' group is like that in the *H. serranus–H. prognathus* lineage, but is somewhat less specialized (see Greenwood, 1974); the lower pharyngeal bone and dentition, the form of the lower jaw, the dentition in both jaws, and the large preorbital bulla housing the enlarged maxillary dorsal articular process, however, are peculiarly '*tridens*' specializations.

Most adult fishes in the '*tridens*' lineage differ from those in the '*serranus*' group in having a narrow interorbital, a slightly to much shorter snout (*H. dolichorhynchus* is exceptional in this respect), a larger eye and a shallower cheek. Essentially the same features distinguish '*tridens*' group species from those of the '*prognathus*' line, although the intergroup differences in snout length and interorbital width are less pronounced.

Eye size and cheek depth are, in general, negatively correlated characters, and invariably eye size shows negative allometry with body length. It is thus the more unfortunate that, with few exceptions, we were unable to compare specimens of the '*tridens*' group with similar sized members of the '*serranus*' and '*prognathus*' groups. We would suggest, nevertheless, that the intergroup differences in eye and cheek proportions are probably a consequence of the very different modal adult sizes for the two groups, and that some factor controlling size at maturity may have been involved in their evolutionary histories.

We have been unable to find any features within the '*tridens*' group that can be used to establish intragroup phylogenies (a situation very familiar to the senior author amongst the more speciose lineages of Lake Victoria *Haplochromis*; see Greenwood, 1974).

It is still not possible to determine whether or not *Haplochromis arcanus* Greenwood & Gee, 1969, is a member of the '*tridens*' lineage. That none of the dental specializations found in

H. arcanus (especially the strongly incurved posterolateral teeth of the premaxilla) occurs in any of the new '*tridens*' species, seems to add further weight to the argument that *H. arcanus* is not a member of that group (see Greenwood & Gee, 1969). Its proximate relationship to the '*tridens*' lineage, through the shared common ancestry of that lineage with the *H. serranus–prognathus* line, still seems to be the most reasonable hypothesis.

When *H. dolichorhynchus*, *H. cholorochrous*, *H. tyrianthinus* and *H. cryptogramma* were first described, no radiographs could be made of the material and hence no vertebral counts were given for the species; this can now be rectified. As usual the fused PU_1 and U_1 centra are not included in the counts.

H. dolichorhynchus: 29 (f.1) or 30 (f.8) comprising 12 (f.1) or 13 (f.8) abdominal, and 16 (f.1), 17 (f.7) or 18 (f.1) caudal elements.

H. chlorochrous: 29 (f.3) or 30 (f.7), comprising 12 (f.1) or 13 (f.9) abdominal and 16 (f.3), 17 (f.6) or 18 (f.1) caudal elements.

H. tyrianthinus: 30 (f.6) or 31 (f.2), comprising 13 abdominal and 17 (f.6) or 18 (f.2) caudal elements.

H. cryptogramma: 29 (f.2), 30 (f.6) or 31 (f.2), comprising 12 (f.1) or 13 (f.9) abdominal and 16 (f.1), 17 (f.7) or 18 (f.2) caudal elements.

New species of the *H. serranus* group

Haplochromis nanoserranus sp. nov.

HOLOTYPE. An adult male 76·0, standard length, from the Mwanza Gulf, caught in a trawl shot near the eastern end of the Muranda peninsula and fished towards the northwestern point of Luansa Bay; substrate sandy mud, water depth *c.* 4–8 m. BM(NH) reg. no. 1977.1.10:54.

The trivial name is from the Latin *nanus*, a dwarf, and *serranus*, with reference to *H. serranus* (Pfeffer).

DESCRIPTION (Figs 14 & 15). Based on 6 specimens (including the holotype), 72·0–76·0 mm standard length. All specimens are adult males.

Depth of body 30·0–33·0 (M = 31·8) % of standard length, length of head 31·0–35·0 (M = 33·7) %.

Dorsal head profile straight, sloping at an angle of 30–35°; the snout profile, when viewed laterally, is noticeably acute and the premaxillary pedicels are prominent. The cephalic lateral line pores, except those of the preorbital and dentary, are not noticeably enlarged; the pre-

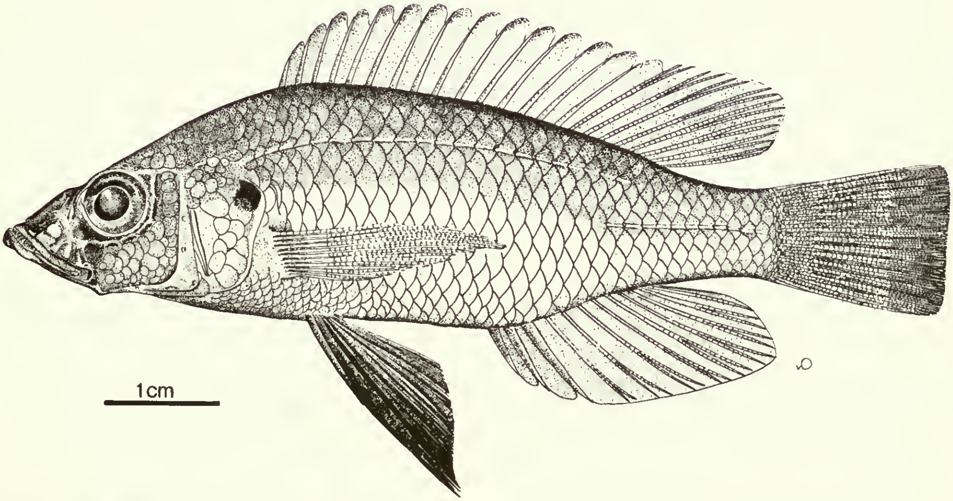

Fig. 14 *Haplochromis nanoserranus*. Holotype. Drawn by M. J. P. van Oijen.

orbital lateral line tubules are as obvious as those of species in the *H. tridens* group and there is also a small anterior bullation of that bone (see above p. 155).

Preorbital depth 16·0–18·0 (M = 17·0)% of head, least interorbital width 16·0–18·0 (M = 17·0)%. Snout varying from a little broader than long to slightly longer than broad (1·1 times), its length 29·0–31·0 (M = 30·2)% of head. The eye and orbit are noticeably elliptical, the former with a fairly well-developed anterior and anteroventral aphakic aperture; greatest diameter of eye 25·0–32·0 (M = 29·0)% of head. Cheek depth 17·0–22·0 (M = 19·3)%.

Caudal peduncle 1·6–1·9 (mode 1·6) times longer than deep, its length 18·0–21·0 (M = 19·0)% of standard length.

Mouth moderately oblique, inclined at an angle of 20–35° (mode *c.* 30°); posterior tip of the maxilla generally reaching a vertical through the anterior part of the eye, but sometimes only reaching a vertical through the anterior orbital margin. Premaxilla with its dentigerous arm somewhat expanded anteroposteriorly in the midline, giving the bone a moderately beaked appearance, jaws equal anteriorly. Dentary with a fairly prominent mental process. Lower jaw 2·3–2·8 times longer than broad, its length 45·0–52·0 (M = 47·0)% of head.

Gill rakers. 9 or 10 on the lower part of the first gill arch, the lower 1–3 rakers reduced, the remainder variously shaped but usually slender, except for the uppermost 2 or 3 which are generally flattened and either bifid or anvil-shaped.

Scales. Ctenoid; lateral line with 32 (f.2) or 33 (f.4) scales, cheek with 3 or 4 rows. Six or 6½ scales between the lateral line and the dorsal fin origin, 6–7 (mode 6½) between the pectoral and pelvic fin bases.

Fins. Dorsal with 24 (f.1) or 25 (f.5) rays, comprising 14 (f.1), 15 (f.3) or 16 (f.2) spinous and 8 (f.1), 9 (f.2) or 10 (f.3) branched elements. Anal with 12 (f.6) rays comprising 3 spines and 9 branched rays. Pectoral fin 26·0–31·0 (M = 28·5)% of standard length. Pelvics with the first branched ray moderately to strongly produced. Caudal truncate, scaled on its basal half.

Teeth. In *both jaws* the majority of teeth in the *outer row* are slender, somewhat recurved and caniniform unicuspids. A few bi- and weakly tricuspid teeth occur posteriorly and posterolaterally in the lower jaw but none was found in the upper jaw.

The occurrence of a predominantly unicuspid and caniniform outer tooth row in such small fishes is most unusual (see Greenwood, 1974 : 106); for example, in *Haplochromis pellegrini*, the only other member of the *H. serranus–H. prognathus* species complex with small adults, fishes less than 85 mm S.L. usually have a predominance of bi- and weakly bicuspid teeth in the outer row, and only a few unicuspids present anteriorly in the jaws.

The *inner teeth*, which are implanted obliquely, may all be tricuspids, or a mixture in which tricuspids predominate over unicuspid and weakly tricuspid teeth, or even one in which unicuspids predominate. The tricuspid teeth have compressed crowns but cylindrical necks, the unicuspids are somewhat compressed.

There are 2 or, rarely, 3 rows of inner teeth in the upper jaw, and 1 or 2 rows in the lower jaw.

Osteology. No complete skeleton is available, and but little information about the details of neurocranial architecture could be obtained from radiographs. The supraoccipital crest (at least as compared with that in specimens of the *H. tridens* group) is relatively high.

Superficial dissection shows that the *preorbital* bone has a small and clearly circumscribed bulla near its anterior border, and that the dentigerous surface of the dentary is flared outwards so that the lateral face of the bone is markedly concave; the concavity does not, however, extend forward to the symphysial region.

The *lower pharyngeal bone* (Fig. 15) has its dentigerous surface broader than long; its teeth are fine and cuspidate, and are arranged in about 28 rows.

There are 29 (f.1) or 30 (f.5) vertebrae (excluding the fused PU_1 and U_1 centra), comprising 13 abdominal and 16 or 17 caudal elements.

Coloration. The live coloration of this species is unknown, and *preserved colours* are known only for *adult males*.

The body above the midlateral line, the entire head except for the operculum, and the entire caudal peduncle are a light greyish-brown. Below the midlateral line (i.e. on the chest, belly and ventral flanks) the colour changes to silvery grey with, in a few specimens, a darker, almost dusky chest region. Some specimens have a broad, but faintly indicated midlateral band which is interrupted at about its midpoint and becomes broader over its posterior half. This band appears to extend onto the caudal fin (whose middle portion may be darker than the rest of the fin even in specimens lacking a midlateral stripe). The operculum is silvery (except for a typical opercular spot in its posterodorsal angle), the dorsal and anterolateral aspects of the snout are dusky, as are the median and mediolateral aspects of the upper lip, and there is a faint and relatively narrow lachrymal stripe running onto the lower jaw behind the posterior tip of the maxilla.

The dorsal and caudal fins are greyish, the membrane of the soft dorsal sometimes weakly maculate. The anal is hyaline to greyish, its ocelli (egg dummies) dead white. The pelvic fins are black, and the pectorals hyaline.

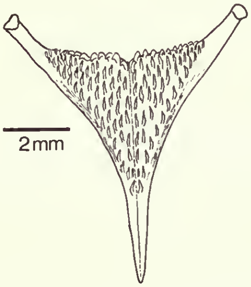

Fig. 15 *Haplochromis nanoserranus.* Lower pharyngeal bone in occlusal view.

ECOLOGY. *Habitat.* The specimens on which this description is based are all from shallow (*c.* 4–8 m) offshore waters, and were caught over a muddy sand substrate. (The senior author recalls examining specimens of a similar and probably identical taxon caught in similar habitats in the northern and eastern regions of the lake; regrettably, this material was lost in transit from east Africa to Britain.)

FOOD. One of the specimens examined had the remains of a small cichlid fish in its intestines; two others contained fragments of larval insects (in one fish larval Diptera, in the other what appeared to be the remains of a larval boring mayfly, *Povilla adusta*), and the remaining two fishes yielded only an unidentifiable sludge in both the stomach and intestines.

BREEDING. Apart from the fact that all 6 specimens are small (72–76 mm S.L.) and are sexually active males, nothing is known about the reproductive habits of this species.

DIAGNOSIS AND AFFINITIES. At first sight, specimens of *H. nanoserranus* closely resemble members of the *H. tridens* species complex. However, detailed examination shows that, unlike '*tridens*' species, *H. nanoserranus* has only unicuspid teeth in the outer series of the upper jaw, and a mixture of unicuspid and weakly bicuspid teeth in the lower jaw. Furthermore, the unicuspid teeth in *H. nanoserranus* are of the slender, near-cylindrical and caniniform type found in piscivorous predators of the *H. serranus–H. prognathus* lineage (see Greenwood, 1974), and not the more flattened, angular type characteristic of the '*tridens*' group. Also, in *H. nanoserranus* the preorbital bone has only a small and well-circumscribed, nearly circular bulla, unlike the larger and vertically more elongate bulla of the '*tridens*' type (see above, p. 155); the lower pharyngeal bone in *H. nanoserranus* (see Fig. 15) has not the slender and elongate form so characteristic of the '*tridens*' group (cf. Fig. 15 and Fig. 5).

Unfortunately, no details are available on the syncranial architecture of *H. nanoserranus*, but judging from radiographs its neurocranium has essentially the outline and proportions of an *H. serranus*-group fish rather than the lower and more elongate type found amongst members of the '*tridens*' group (see Greenwood, 1974 and p. 155 for a discussion of these neurocranial features).

Thus, at least for the moment, we are placing *H. nanoserranus* in the '*serranus*' subdivision of the *H. serranus–H. prognathus* lineage of Greenwood (1974), but noting that it does show, at least incipiently, certain features seen in members of the *H. tridens* species complex.

When making comparisons between *H. nanoserranus* and members of the *H. serranus* group we were hampered by the fact that very few small specimens of species in that complex have been described or are available for study (see Greenwood, 1962 & 1967). Consequently the small but adult specimens of *H. nanoserranus* had to be compared with much larger and often juvenile specimens of the '*serranus*' group. If, as seems most likely, some of the diagnostic features we used are subject to allometric growth, then small specimens of '*serranus*' group species may resemble *H. nanoserranus* more closely than we realize at present.

From *H. serranus* itself (see Greenwood, 1962 : 152, figs 4 & 5), *H. nanoserranus* differs in having a longer and more slender caudal peduncle (18·0–21·0, M = 19·0% standard length, cf. 13·0–19·0, M = 15·4%, and 1·6–1·9, mode 1·6, times longer than deep, cf. 1·1–1·5, mode 1·2 times), a shorter head (31·0–35·0, M = 33·7% S.L., cf. 34·8–38·7, M = 36·3%), a narrower interorbital (16·0–18·0, M = 17·0% head, cf. 20·4–26·8, M = 23·3%), a larger eye (25·0–32·0, M = 29·6% head, cf. 20·4–26·0, M = 23·3%), a shallower cheek (17·0–22·0, M = 19·3% head, cf. 22·9–31·5, M = 27·5%) and a shorter lower jaw (45·0–52·0, M = 47·0% head, cf. 48·0–60·0, M = 54·3%).

From *Haplochromis victorianus* (see Greenwood, 1962 : 156, pl. 1) it differs in its shallower body (30·0–33·0, M = 31·8% S.L., cf. 33·4–41·3, M = 37·3%), narrower interorbital (16·0–18·0, M = 17·0% head, cf. 21·5–24·5, M = 22·6%), shorter snout (29·0–31·0, M = 30·2% head, cf. 31·8–36·0, M = 34·0%), larger eye (25·0–32·0, M = 29·0% head, cf. 21·7–25·5, M = 23·6%) and a shallower cheek (17·0–22·0, M = 19·3% head, cf. 22·5–26·2, M = 24·6%).

From *Haplochromis maculipinna* (see Greenwood, 1967 : 43, fig. 3) it is differentiated by its shallower body (30·0–33·0, M = 31·8% S.L. cf. 33·3–37·0, M = 35·9%), longer and shallower caudal peduncle (18·0–21·0, M = 19·1% S.L., cf. 14·5–18·8, M = 16·3%, and 1·6–1·9, mode 1·6, times longer than deep, cf. 1·2–1·8, mode 1·1–1·2 times), narrower interorbital (16·0–18·0, M = 17·0% head, cf. 20·7–25·5, M = 22·8%), somewhat shorter snout (29·0–31·0, M = 30·2% head, cf. 30·3–37·0, M = 33·7%) and shallower cheek (17·0–22·0, M = 19·3% head, cf. 23·2–29·8, M = 25·3%).

It is interesting to note that the relative proportions of the eye diameter and lower jaw length are similar in the two species, despite the size discrepancy of the specimens examined.

From *Haplochromis boops* and *H. thuragnathus* (see Greenwood, 1967 : 47–51, fig. 4), *H. nanoserranus* differs in its much shallower body (30·0–33·0, M = 31·8% S.L., cf. 40·5–42·0 (no means given because *H. boops* and *H. thuragnathus* are known from so few specimens)), somewhat less steeply inclined dorsal head profile (30–35°, cf. 40–50°), narrower interorbital (16·0–18·0, M = 17·0% head, cf. 21·7–25·7%) and shallower cheek (17·0–22·0, M = 19·3% head, cf. 28·0–30·0%). The three species show complete overlap in the relative proportions of eye diameter and lower jaw length.

The three other previously known species of the *H. serranus* group (*Haplochromis plagiostoma*, *H. cavifrons* and *H. decticostoma*) are immediately distinguishable from *H. nanoserranus* on the basis of their gross morphology, especially their respective head shapes (compare Fig. 14 above with the figures of these species in Greenwood, 1962, and Greenwood & Gee, 1969 for *H. plagiostoma* and *H. cavifrons*, and *H. decticostoma* respectively).

From the other new and presumed member of the *H. serranus* complex, *Haplochromis cassius* (see below and Fig. 16). *H. nanoserranus* is readily distinguished by its finer, smaller and more numerous outer teeth, and by its less enlarged lips.

It is not yet possible to determine the phyletic relationships of *H. nanoserranus* within the *H. serranus* species group. The species does, however, seem to show the same morphological relationships with the congeners of its lineage as does *H. pellegrini* with its congeners in the *H. prognathus* lineage of the '*serranus–prognathus*' group (see Greenwood, 1974). In other words, it is a morphologically somewhat specialized 'dwarf' amongst a radiation of relative 'giants'.

STUDY MATERIAL AND DISTRIBUTION RECORDS

Museum and Reg. No.	Locality	Collector
	TANZANIA	
BM(NH) 1977.1.10:54 (Holotype)	East of Muranda peninsula towards the northwestern point of Luansa bay, Mwanza Gulf	Anker & Barel
BM(NH) 1977.1.10:55–59 (Paratypes)	East of Muranda peninsula towards the northwestern point of Luansa bay, Mwanza Gulf	Anker & Barel

Haplochromis cassius sp. nov.

HOLOTYPE. An adult female, 97·5 mm S.L., from the southern part of the Mwanza Gulf off Busissi, at a depth of 2 m, over a mud bottom. BM(NH) reg. no. 1977.1.10:49.

The trivial name derives from Shakespeare's 'Julius Caesar' (Act I, scene II) '. . . Yond Cassius has a lean and hungry look . . .'.

We are well aware of the dangers inherent in describing new taxa of Lake Victoria *Haplochromis* from small and unisexual samples; but the peculiar dentition and enlarged lips of this species are so distinctive that we feel justified in our actions.

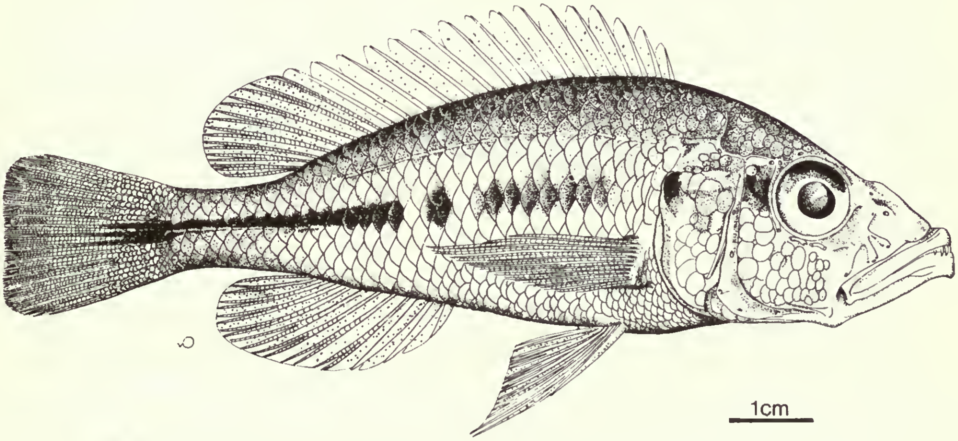

Fig. 16 *Haplochromis cassius*. Holotype. Drawn by M. J. P. van Oijen.

DESCRIPTION (Figs 16–18). Based on 5 specimens (including the holotype), 70·5–97·5 mm S.L. All are females.

Depth of body 29·0–34·0 (M = 31·0) % of standard length, length of head 36·0–40·0 (M = 37·0) %. Dorsal head profile straight or gently decurved (its outline interrupted by the prominent premaxillary pedicels) and sloping at an angle of 30–40°. The cephalic lateral line pores, and the tubules on the preorbital bone, are not noticeably enlarged.

Preorbital depth 16·0–21·0 (M = 18·0) % of head length, interorbital width 17·0–20·0 (M = 18·0) %. Snout broader than long, its length 30·0–36·0 (M = 33·3) % of head. Eye and orbit very slightly elliptical, the eye with a well-defined anterior and anteroventral aphakic aperture; eye diameter 26·0–31·0 (M = 28·0) % of head. Cheek depth 20·0–22·0 (M = 21·0) %.

Caudal peduncle 1·7–1·9 times longer than deep, its length 17·0–19·0 (M = 18·0) % of standard length.

Mouth slightly oblique, inclined at an angle of 15–20°; jaws equal anteriorly, the posterior tip of the maxilla just reaching a vertical through the anterior margin of the eye. Premaxilla with a well-developed beak (i.e. a median anteroposterior expansion of its dentigerous arm). Both the upper and lower lips are noticeably thickened, more so than in any other species of the '*serranus*' group. The lower jaw 2·5–2·8 times longer than broad, its length 43·0–48·0 (M = 44·0) % of head length; dentary without a marked mental protuberance.

Gill rakers. 10 or 11 (mode) on the lower part of the first gill arch, the lowermost 1 or 2 (exceptionally 4) reduced, the remainder slender except for the uppermost 2 or 3 which are flattened and bi- or tri- or polyfid.

Scales. Ctenoid; lateral line with 33 (f.3) or 34 (f.2) scales, cheek with 3 (f.2) or 4 (f.3) rows. Five to 6½ scales between the lateral line and the dorsal fin origin, 6 (mode) to 7 between the pectoral and pelvic fin bases.

Fins. Dorsal with 24 (f.1) or 25 (f.4) rays, comprising 15 (f.3) or 16 (f.2) spines and 9 (f.3) or 10 (f.2) branched rays. Anal fin with 12 rays, comprising 3 spines and 9 branched rays. Pectoral fin 26·0–28·0 (M = 27·0) % of standard length. Pelvics with the first branched ray very slightly produced. Caudal truncate, scaled on its basal third to half.

Teeth. The *outer teeth* in *both jaws* are large, somewhat recurved, caniniform unicuspids and are very widely spaced. When the jaws are closed some teeth lie outside the lip of the opposing jaw, while others seem to become embedded in the gum and lip tissues of that jaw. This unusual condition may, of course, be merely a preservation artefact, and consequent upon the thickening of gum and lip tissues in the fixative.

There are only 30–40 teeth in the outer row of the upper jaw.

The *inner teeth* are mostly small unicuspids, but some weakly tricuspid teeth also occur in these series; all are obliquely implanted, and are arranged in 1 or 2 rather irregular rows in both jaws.

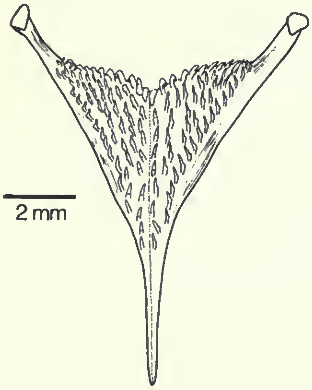

Fig. 17 *Haplochromis cassius*. Lower pharyngeal bone in occlusal view.

Osteology. No complete skeleton is available. The *lower pharyngeal bone* (Fig. 17) has its dentigerous surface very slightly longer than broad; its teeth are cuspidate and compressed, vary in form from fine to relatively robust (especially those near the midline) and are arranged in 24–26 rows. There are 30 (f.3) or 31 (f.2) vertebrae (excluding the fused PU_1 and U_1 centra), comprising 13 (f.4) or 14 (f.1) abdominal and 16 (f.1), 17 (f.2) or 18 (f.2) caudal elements.

Coloration. In life, an *adult* but *quiescent female* (BM(NH) reg. no. 1977.1.10:51, see Fig. 18) has the dorsum of the head dark grey-blue, the preorbital region, cheek, preoperculum and lips greyish, the operculum is silvery with a dark opercular blotch and the branchiostegal membrane whitish. The dorsum of the body is grey-blue anteriorly, lighter, almost silver posteriorly. The flanks are silver-grey, darkest anteriorly, with a dark midlateral stripe that is interrupted at about its midpoint. The chest, belly and caudal peduncle are silvery white, the dorsal aspect of the latter rather darker.

The dorsal and pectoral fins are hyaline, the pelvics hyaline, the anal fin grey-silver and the caudal hyaline.

Details of *preserved* coloration are available for *females* only (both immature and adult). The ground coloration is sandy-grey above the midlateral line (except the dorsum) and also on the head save for the cheeks and dorsum. Below the midlateral line the sandy-grey colour gradually becomes silvery-white. The dorsum of the head and body are dark brown, and the cheeks are silvery.

A broad and well-defined midlateral stripe (variously but narrowly interrupted) runs from behind the head to the basal part of the caudal fin. Immediately below the dark dorsum, and in places continuous with it, is an indistinct dark line which runs parallel to the dorsal outline of the body; posteriorly this line merges completely with the dark coloration of the back.

A faint, weakly V-shaped, bar crosses the snout at about the level of the lower orbital margin; in some specimens there is a short, faint and ill-defined lachrymal blotch.

All the fins are hyaline (except for a small area on the caudal where the midlateral band of the body terminates).

ECOLOGY. *Habitat.* The 5 specimens came from three different collecting stations in the Mwanza Gulf, viz. a point slightly south of the crossing between the Muranda peninsula and the opposite shore, at a depth of *c.* 4–6 m (no substrate data were recorded), another trawl haul near this area at a depth of *c.* 6–10 m over mud and, thirdly, a trawl made in the southern part of the gulf near Busissi, again over mud at a depth of only 2 m.

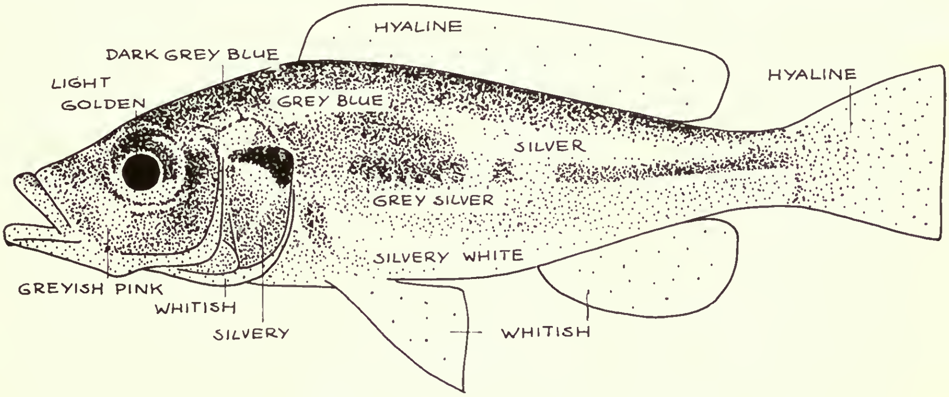

Fig. 18 *Haplochromis cassius.* Adult female (quiescent), to show coloration. Drawn by M. J. P. van Oijen.

FOOD. The feeding habits of *H. cassius* certainly cannot be determined from the small sample of guts examined, the more especially since the ingested matter is so heterogeneous. One of the 4 specimens examined was without food in any part of the gut. One fish had an empty stomach, but the remains of at least one small cichlid fish in the intestine. The other two specimens (both from the same locality and trawl haul) had the entire intestine packed with diatom frustules (mostly a colonial form resembling *Melosira*). One of these fishes had a similar diatom mass in its stomach, but the stomach of the other fish was empty.

It is difficult to account for the almost purely diatom intake of these two fishes other than by assuming that they had actively selected the diatoms as food. The nature of the gut contents certainly does not suggest that the material had been ingested while the fishes were impounded in the net and being dragged through the flocculent organic mud at the mud-water interface (see above, pp. 146 & 154) because this interface is unlikely to be composed purely of diatoms (and only one taxon at that). The organic constituents of the near-liquid mud are predominantly blue-green algae, with diatoms (and particularly the *Melosira* type of diatoms) forming but a small proportion of the whole.

Much more material of *H. cassius* will have to be examined, and more details about the substrate obtained, before this particular trophic puzzle can be solved.

The intestine of *H. cassius* is of moderate length (*c.* 1½ times S.L.) and thus more typical of a predatory than a herbivorous species.

BREEDING. No information is available on the reproductive habits of *H. cassius*. In the one sexually active fish represented in our sample, the right ovary is much larger than the left one, although the latter does have near full-term ova present in it.

DIAGNOSIS AND AFFINITIES. *Haplochromis cassius* is readily distinguished from all other members of the *H. serranus–H. prognathus* lineage (see Greenwood, 1974), and all other species with a 'predatory' facies, by its noticeably thickened lips and by its well-spaced, caniniform teeth some of which, at least in preserved specimens, are visible when the mouth is closed. This species also differs from members of the *H. serranus–H. prognathus* complex in having a shorter lower jaw, narrower interorbital, shallower cheek, larger eye (but this possibly a correlate of its small adult size), and a higher gill raker count (modal number of rakers 11, cf. 9 for the other species, in a few of which 10 rakers have been counted in the occasional specimen).

If *H. nanoserranus* (see above, p. 159) is also a member of the *H. serranus* group, it too has a narrower interorbital, larger eye and a shallower cheek, but again the adult size of this species is much smaller than that for other members of the group. *Haplochromis nanoserranus* does, however, have a lower jaw length and a gill raker count more typical for the *H. serranus* group than does *H. cassius*.

Until more anatomical information is available for *H. cassius* its relationships within the *H. serranus* species complex remain indeterminable except as a dentally specialized offshoot of this lineage.

STUDY MATERIAL AND DISTRIBUTION RECORDS

Museum and Reg. No.	Locality	Collector
	TANZANIA	
BM(NH) 1977.1.10:49 (Holotype)	Southern part of the Mwanza Gulf near Busissi (2 m)	Anker & Barel
BM(NH) 1977.1.10:50 (Paratype)	Southern part of the Mwanza Gulf near Busissi (2 m)	Anker & Barel
BM(NH) 1977.1.10:51 (Paratype)	Mwanza Gulf, slightly south of Muranda peninsula (*c.* 4–6 m)	Anker & Barel
BM(NH) 1977.1.10:52–53 (Paratypes)	Mwanza Gulf near previous station but at a depth of *c.* 6–10 m	Anker & Barel

A new species of the *H. empodisma–H. obtusidens* group

Haplochromis ptistes sp. nov.

HOLOTYPE. An adult male 98·0 mm S.L. from the Speke Gulf northeast of Tefu Island (between Tefu and Nafuba Islands), at a depth of *c.* 28 m over a mud bottom. BM(NH) reg. no. 1977.1.10:60.

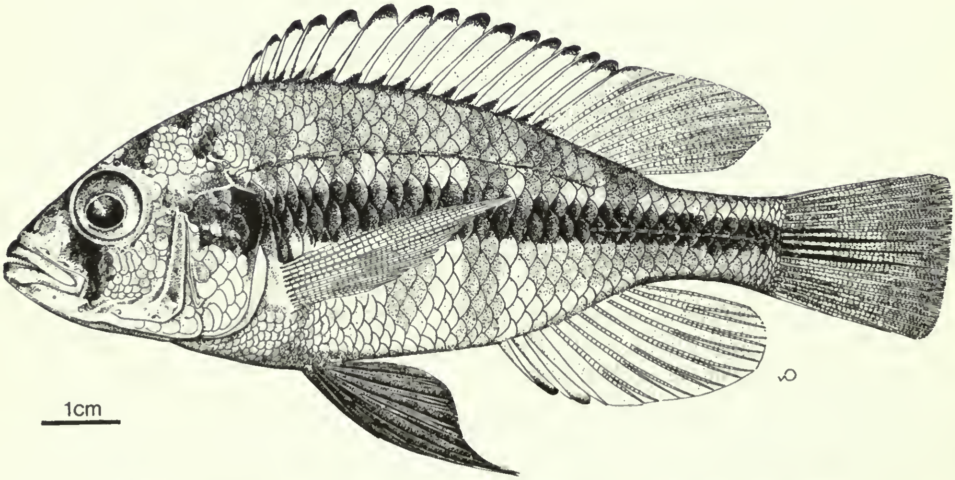

Fig. 19 *Haplochromis ptistes.* Holotype. Drawn by M. J. P. van Oijen.

The trivial name (from the Greek meaning a winnower or sheller) refers to the crushing pharyngeal mechanism of this species and the effect it has on its molluscan prey.

DESCRIPTION (Figs 19–21). Based on 10 specimens (including the holotype) 90·0–106·0 mm standard length.

Depth of body 38·6–42·0 (M = 40·0) % of standard length, length of head 34·2–37·6 (M = 36·0) %.

Dorsal head profile gently decurved and sloping at an angle of 35–40°. The cephalic lateral line pores, and the tubules on the preorbital bone, are moderately enlarged and prominent.

Preorbital depth 14·7–17·4 (M = 16·4) % of head length, least interorbital width 23·5–26·0 (M = 24·7) %. Snout broader than long, its length 29·4–32·4 (M = 30·6) % of head. Orbit and eye virtually circular, the eye with a fairly definite anterior and anteroventral aphakic aperture and, in some specimens, a more definite posterior one as well; eye diameter 26·5–32·4 (M = 30·0) % of head. Cheek depth 20·5–24·3 (M = 22·0) %.

Caudal peduncle 1·3–1·6 (modal range 1·4–1·5) times longer than deep, its length 15·0–18·0 (M = 16·4) % of standard length.

Jaws equal anteriorly, mouth almost horizontal, the posterior tip of the maxilla reaching a vertical through the anterior margin of the eye; premaxilla with a slight median anteroposterior expansion of its dentigerous arm giving it a slightly beaked appearance.

Lower jaw 1·5–1·9 (mode 1·5) times longer than broad, its length 37·3–41·2 (M = 39·0) % of head.

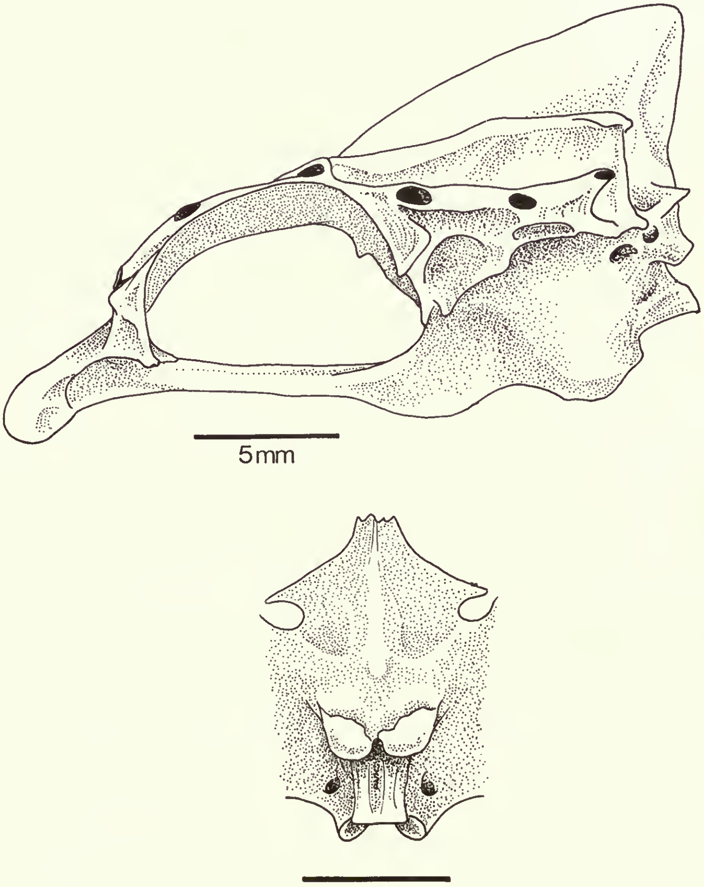

Fig. 20 *Haplochromis ptistes.* Above, neurocranium in left lateral view. Below, the apophysis for the upper pharyngeal bones.

Gill rakers. 8 (mode) or 9 on the lower part of the first gill arch, the lower 1–3 rakers reduced, the remainder short and moderately stout to stout.

Scales. Ctenoid; lateral line with 31 (f.1), 32 (f.7) or 33 (f.2) scales, cheek with 3 (mode) or 4 rows. Five to 6½ (usually 6 or 6½) scales between the dorsal fin origin and the lateral line, 6 or 7 (mode) between the pectoral and pelvic fin bases.

Fins. Dorsal with 23 (f.3) or 24 (f.7) rays, comprising 14 (f.2), 15 (f.4) or 16 (f.4) spines and 8 (f.5) or 9 (f.5) branched rays. Anal with 11 (f.9) or 12 (f.1) rays, comprising 3 spines and 8 (f.9) or 9 (f.1) branched rays. Pectoral 86·6–97·0 (M = 92·0)% of head length. Pelvic fins with the first branched ray produced, proportionately more so in males than in females. Caudal truncate, scaled on its basal third to half (mode).

Teeth. In most specimens less than 100 mm S.L. the *outer teeth* in the *upper jaw* are unequally bicuspid (some weakly so), relatively stout and slightly recurved; the posterior few teeth, however, are unicuspid and slightly enlarged. Specimens over 100 mm S.L. (and one fish of 90 mm S.L.) have mostly stout unicuspid teeth throughout the series. Teeth in the outer row of the *lower jaw* are similar to those in the upper jaw although some bicuspids may occur in larger specimens and a few unicuspids in smaller individuals.

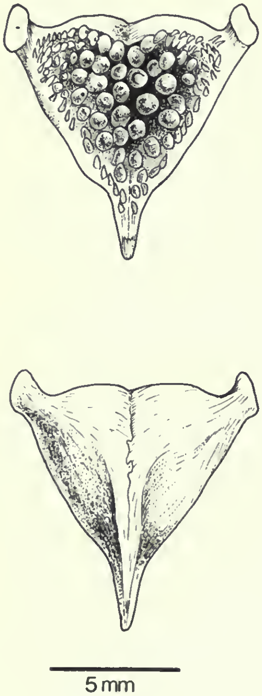

Fig. 21 *Haplochromis ptistes.* Lower pharyngeal bone in occlusal view (above), and in ventral view (below).

There are 60–70 (mode *c.* 65) teeth in the outer row of the upper jaw.

The teeth of the *inner rows* in both jaws are small, compressed, tricuspids, arranged in 2 rows in the upper jaw and a single (sometimes irregular) row in the lower jaw.

Osteology. Neurocranium. The neurocranium of *Haplochromis ptistes* (Fig. 20) shows a close overall resemblance to that of *Haplochromis obtusidens* (see Greenwood, 1960 : 267, and 1974, figs 43 & 65). The dorsal profile is straight and slopes at a moderate angle, in these respects differing somewhat from the neurocranial type found in the other mollusc-crushing lineage represented by *Haplochromis ishmaeli* and *H. pharyngomylus* (see Greenwood, 1974 : 74, fig. 43). Here the orbital region is relatively high-vaulted, and consequently the preorbital profile is somewhat decurved and slopes more steeply than in *H. ptistes.*

The apophysis for the upper pharyngeal bones (Fig. 20) in this species is rather stouter and has a larger articular surface than the apophysis in *H. obtusidens*, but it is smaller and has a lesser contribution from the basioccipital than does the apophysis of *H. ishmaeli* or *H. pharyngomylus*.

The *lower pharyngeal bone* (Fig. 21) is stout, with the majority of its teeth enlarged and molariform; only those teeth contributing to the marginal row, and those situated in the posterolateral angles of the bone, are distinctly cuspidate and not particularly enlarged. The bone has a characteristic outline shape (Fig. 21) with a marked shoulder occurring a little posterior to the point where the bone narrows to form the anteriorly directed blade. In lateral view the occlusal surface is gently concave over its entire area.

When compared with the pharyngeal bones of *H. ishmaeli* and *H. pharyngomylus* (and in one of the new species described below, p. 176), that of *H. ptistes* is relatively less hypertrophied and its teeth are also less massive. However, its dentigerous area is relatively larger and there are somewhat more molariform teeth than in *H. obtusidens.*

In other words, the lower pharyngeal bone and dentition of *H. ptistes* occupy a morphologically intermediate position between those of the lineages represented by *H. ishmaeli* and *H. pharyngomylus* on the one hand, and by *H. obtusidens* on the other.

The dentary in *H. ptistes* is relatively shallow and elongate, resembling that in *H. obtusidens* rather than the dentary of *H. ishmaeli* or *H. pharyngomylus.*

There are 28 (f.2) or 29 (f.2) vertebrae (excluding the fused PU_1 and U_1 centra) in the 4 specimens radiographed, the total comprising 12 (f.2) or 13 (f.2) abdominal and 16 caudal elements.

Coloration. The *live colours* of *H. ptistes* are unknown. *Preserved coloration. Adult males.* The dorsum is yellowish-brown shading to a lighter tone on the flanks; the belly and chest are dusky. A dark, horizontally aligned blotch extends from immediately behind the eye posteriorly across the operculum where it deepens slightly and becomes confluent with, or is narrowly separated from, a broad midlateral stripe on the flank. This stripe may narrow or be interrupted at about the middle of the body; posteriorly it extends onto the caudal fin, the hind margin of which it reaches. Some specimens show traces of 3 or 4 broad vertical bars on the lower flanks and belly; very faint traces of these bars continue onto the upper flanks and back. In other specimens the bars are barely visible.

The head has two definite black bars across the snout, the upper one extending from orbit to orbit. A supraorbital stripe runs obliquely upwards from the dorsoposterior margin of the orbit almost to the midline, where it is narrowly separated from its partner of the opposite side; in most specimens the supraorbital bars are virtually rectangular in outline but in a few they are roughly triangular (but never so definitely triangular as in *Haplochromis teegelaari*, see p. 173 below).

A broad lachrymal band runs almost vertically downwards onto the anguloarticular region of the lower jaw or even further ventromedially. The branchiostegal membrane is dusky in some specimens, but pale in others.

A bar of variable intensity and completeness extends vertically upwards from a point almost at the middle of the upper opercular margin; the bar of each side meets, albeit faintly, or is narrowly separated from, its counterpart. In several specimens there is a well-defined black bar following the outline of the preoperculum, but in others it is extremely faint.

The dorsal fin is greyish, with black lappets on the spinous part and dark maculae on the soft part of the fin. The caudal is darkly maculate, especially over its upper half, and has a dark midlateral streak. The anal fin is greyish, and the pelvics are black.

Adult females have a pale yellow-brown ground colour, with the chest, belly and operculum silvery (the latter with a large dark blotch at its posterodorsal angle). There is a faint but distinct dark midlateral stripe extending from the preopercular margin to the posterior margin of the caudal fin. The lachrymal stripe is very faint and short.

The dorsal and caudal fins are greyish, the former with black lappets, the latter with a midlateral stripe, and faint maculae on its upper half. The anal and pelvic fins are hyaline.

ECOLOGY. *Habitat.* All 10 specimens came from a single trawl haul made in the Speke Gulf, between Tefu and Nafuba Islands, at a depth of *c.* 28 m over a mud bottom.

FOOD. Of the 8 specimens examined, 4 contained only flocculent organic detritus (principally blue-green algae with some diatoms and green algae) throughout the entire alimentary tract. The other 4 specimens contained, in addition to this detrital matter, fragments of mollusc shells (either of unidentifiable bivalves together with the gastropod *Melanoides tuberculata*, or of the bivalves alone).

As with the other species from this station and haul (see p. 146), the detritus may have been ingested whilst the fishes were being dragged through the mud-water interface during capture.

The intestine of *H. ptistes* is very long (*c.* 2½ times the standard length) and much coiled, an unusual feature for a species with the hypertrophied pharyngeal apparatus of a mollusc eater.

BREEDING. Nothing is known about the reproductive habits of *H. ptistes*. All the specimens available are adult and none is sexually active. The single female caught (90 mm S.L.) has its ovaries in an advanced stage of oogenesis, the right ovary being slightly larger than the left one.

DIAGNOSIS AND AFFINITIES. *Haplochromis ptistes* is distinguished from all previously described species with hypertrophied pharyngeal bones and teeth by the outline shape of its lower pharyngeal bone (see Fig. 21) and by the following characters for the species severally:

(i) From *H. obtusidens* (see Greenwood, 1960 : 266, fig. 18) by its more massive lower pharyngeal bone and the more extensive molarization of its lower pharyngeal dentition, its larger eye (26·5–32·4, M=30·0% head, cf. 24·3–30·8, M=27·2%), slightly longer snout 29·4–32·4, M=30·6% head, cf. 26·0–31·0, M=28·5%), shallower cheek (20·5–24·3, M=22·0% head, cf. 21·2–30·0, M=26·7%), longer pectoral fin (86·6–97·0, M=92·0% head, cf. 73·5–103·0, M=86·8%) and by the markedly different pattern of cephalic markings visible in preserved adult males. (Live colours of *H. ptistes* are unknown.)

(ii) From *H. ishmaeli* and *H. pharyngomylus* (see Greenwood, 1960 : 270–279, figs 19–21) by the presence of definite snout and supraorbital markings in preserved specimens, by its larger eye (26·5–32·4, M=30·0% of head, cf. 23·0–31·8, M=26·5 and 23·0–31·0, M=27·7 for *H. pharyngomylus* and *H. ishmaeli* respectively), the greater number of teeth in the outer row of the upper jaw (modal number 65, cf. 44–52 and 36 for *H. ishmaeli* and *H. pharyngomylus* respectively), the straight preorbital profile of the neurocranium, the less massive lower pharyngeal bone, and by its higher modal number of gill rakers (8 cf. 7); *H. ptistes* is further distinguished from *H. pharyngomylus* by its longer pectoral fin (86·6–97·0, M=92·0% head, cf. 68·5–91·0, M=79·6%) and by the greater posterior extension of its maxilla (reaching a vertical through the anterior part of the eye in *H. ptistes*, but only to the orbital margin, or not even to that level, in *H. pharyngomylus*).

From the two newly discovered species with hypertrophied pharyngeal mills (see pp. 169–174 below), *H. ptistes* is distinguished as follows:

(i) From *H. teegelaari* (see p. 169: Figs 22–27) by its snout being broader than long, by differences in the neurocranial architecture (dorsal preorbital profile straight, compared with a more obviously vaulted and curved orbital–preorbital region; cf. Figs 20 and 24), the slightly less massive ventral apophysis, with a smaller articular area for the upper pharyngeal bones cf. Figs 20 and 25), the less markedly concave occlusal surface of the lower pharyngeal bone and by the rectangular as opposed to triangular supraorbital markings in preserved males. (The well-defined midlateral body stripe of *H. ptistes* seemingly is also diagnostic in preserved material.)

The degree of lower pharyngeal bone enlargement, and the extent to which its teeth are molarized, are similar in both species, but the bone of *H. ptistes* has a very characteristic shape when seen in occlusal view (cf. Figs 21 & 26). The two species show a virtually complete overlap in the mean values of all morphometric features except that of relative snout width (see above).

(ii) From *Haplochromis mylergates* (p. 174, Figs 29–31), *H. ptistes* is readily distinguished by its less massive lower pharyngeal bone, which also lacks the deeply concave occlusal surface seen in *H. mylergates*, by differences in skull architecture (similar to those distinguishing *H. ptistes* from *H. teegelaraai*, see above and also Figs 20 & 24), by the more gradually pointed snout as seen in dorsal view (see Fig. 23), and by differences in preserved coloration, especially the absence in *H. mylergates* of prominent cephalic markings (save for the lachrymal stripe).

On the basis of its neurocranial shape, and its relatively shallow dentary (as compared with the more generalized skull shape and deeper dentary of *H. ishmaeli*, *H. pharyngomylus* and *H.*

mylergates, and the generalized skull shape of *H. teegelaari*), *H. ptistes* is thought to be a member of the *H. empodisma–H. obtusidens* lineage of mollusc crushing species (see Greenwood, 1974), probably the derived (apomorph) sister species of *H. obtusidens*. In addition to showing certain derived morphological features, *H. ptistes* should perhaps also be considered specialized because of its relatively deeper water habitat.

STUDY MATERIAL AND DISTRIBUTION RECORDS

Museum and Reg. No.	Locality	Collector
	TANZANIA	
BM(NH) 1977.1.10:60 (Holotype)	Speke Gulf, between Tefu and Nafuba Islands, *c*. 28 m	Anker & Barel
BM(NH) 1977.1.10:61–69 (Paratypes)	Speke Gulf, between Tefu and Nafuba Islands, *c*. 28 m	Anker & Barel

New species of the *H. ishmaeli–H. pharyngomylus* group

Haplochromis teegelaari sp. nov.

HOLOTYPE. An adult male 93·0 mm standard length, from the southern part of the Mwanza Gulf near Busissi, caught over a mud bottom at a depth of *c*. 2 m. BM(NH) reg. no. 1977.1.10:16.

The species is named in honour of the late Nico Teegelaar, an outstanding Dutch biological artist whose work contributed much to the researches of the Zoology Department of Leiden University.

DESCRIPTION (Figs 22–27). Based on 23 specimens (including the holotype) 74·0–100·5 mm standard length.

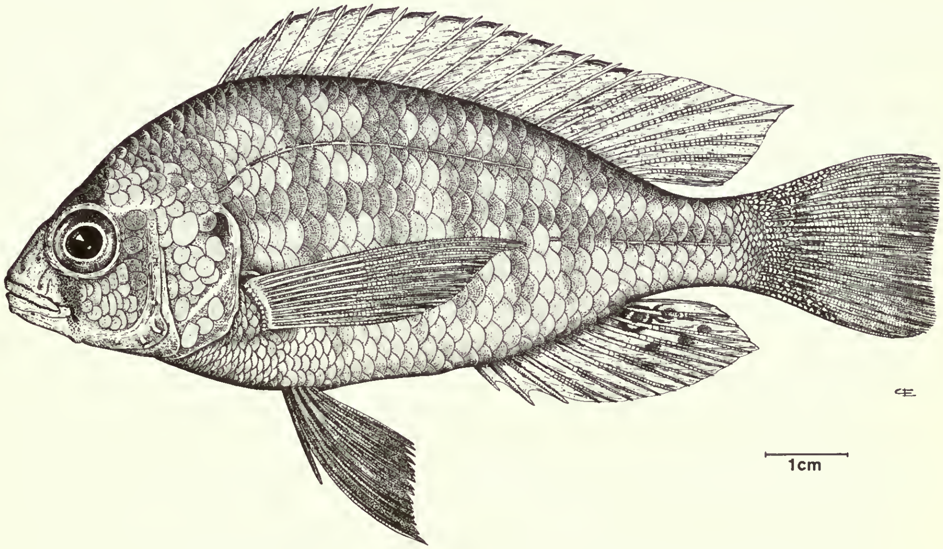

Fig. 22 *Haplochromis teegelaari*. Holotype. Drawn by C. Elzenga.

Depth of body 39·0–43·0 (M = 41·0) % of standard length, length of head 32·0–36·0 (M = 34·0) %.

Dorsal head profile curved to above the eye then straight and sloping steeply downwards at an angle of 40–60° (mode 45°). Cephalic lateral line pores not enlarged, the tubules of the preorbital bone barely visible superficially. Preorbital depth 14·0–19·0 (M = 17·0) % of head, least interorbital width 25·0–30·0 (M = 27·0) %. Snout as broad as long to slightly broader than long (the modal condition), its length 27·0–31·0 (M = 29·0) % head length; when viewed from above the outline of the snout is gently and gradually rounded (see Fig. 23). Eye and orbit virtually circular, the eye with a definite anterior and anteroventral aphakic aperture; diameter of eye 27·0–33·0 M = 30·0) % of head. Depth of cheek 19·0–25·0 (M = 22·0) %.

Caudal peduncle 1·1–1·5 (mode 1·4) times longer than deep, its length 15·0–19·0 (M = 17·0) % of standard length.

Mouth very slightly oblique, inclined at an angle of 5–10° (mode 10°). Jaws equal anteriorly, the posterior tip of the maxilla reaching a vertical through the anterior orbital margin, or slightly beyond that level. Lower jaw 1·4–1·8 (modal range 1·6–1·7) times longer than broad, its length 33·0–40·0 (M = 37·0) % of head.

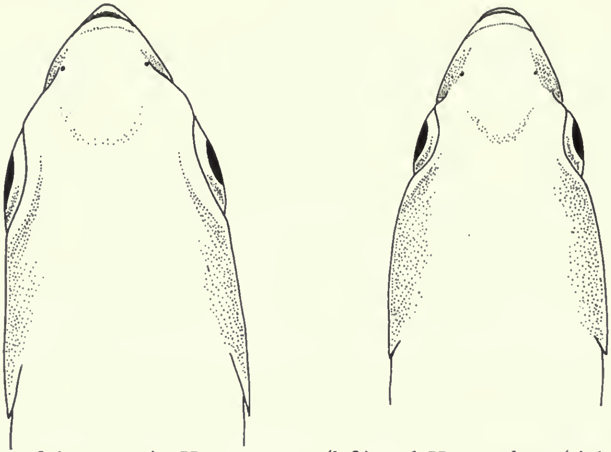

Fig. 23 Dorsal view of the snout in *H. mylergates* (left) and *H. teegelaari* (right), to show differences in outline when viewed from above.

Gill rakers. 7 or 8 (rarely 9) on the lower part of the first gill arch, the lower 1 or 2 (occasionally 3) rakers reduced, the remainder moderately stout and blunt.

Scales. Ctenoid; lateral line with 31 (f.1), 32 (f.7), 33 (f.12) or 34 (f.3) scales, cheek with 3 or 4 (mode) rows. Six to 7½ (usually 6½ or 7) scales between the dorsal fin origin and the lateral line, 6 or 7 (mode) between the pectoral and pelvic fin bases.

Fins. Dorsal with 23 (f.2), 24 (f.12), 25 (f.8) or 26 (f.1) rays, comprising 15 (f.18) or 16 (f.5) spinous and 8 (f.3), 9 (f.14) or 10 (f.6) branched elements. Anal fin with 11 (f.5), 12 (f.16) or 13 (f.2) rays, comprising 3 spines and 8 (f.6), 9 (f.15) or 10 (f.2) branched rays. Pectoral fin 84·0–103·0 (M = 91·0) % of head. Pelvic fins with the first branched ray slightly produced. Caudal truncate, scaled on its proximal half (rarely only on its proximal third) or a little further posteriorly.

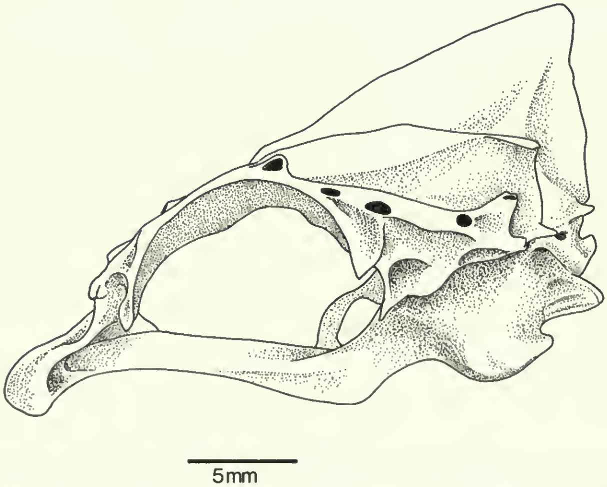

Fig. 24 *Haplochromis teegelaari*. Neurocranium in left lateral view.

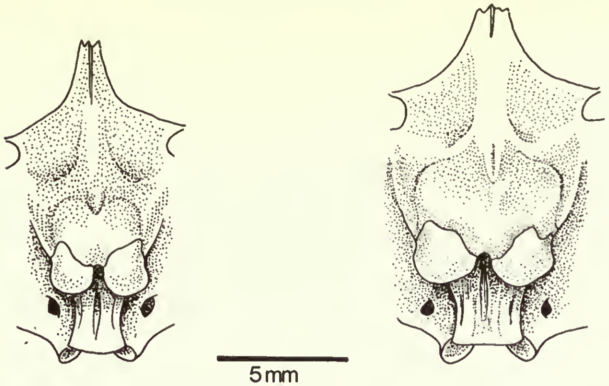

Fig. 25 Apophysis for the upper pharyngeal bones in *H. teegelaari* (left) and *H. mylergates* (right).

Teeth. In most specimens the anterior and anterolateral teeth in the *outer row* of the *upper jaw* are moderately stout bicuspids with compressed, recurved, crowns and cylindrical necks; posteriorly and sometimes posterolaterally, the teeth are unicuspid and stout, with recurved crowns. A few specimens have unicuspid teeth throughout the row, or unicuspids anteriorly, bicuspids laterally, and unicuspids posteriorly. There is no obvious correlation between a predominant tooth form and the fish's size.

In the *outer series* of the *lower jaw*, most specimens have only bicuspid teeth, although a few do have either an entirely unicuspid dentition or some unicuspids posteriorly and a mixture of bi- and unicuspids elsewhere in the jaw.

There are 38–54 (modal range 40–44) teeth in the outer row of the upper jaw.

Teeth forming the *inner series* are usually either a mixture of bi- and tricuspids or one of uni- and bicuspids; a few specimens have a mixture of all three types of teeth. There are 1 or 2 (mode) rows of inner teeth in both jaws.

Osteology. The neurocranium of *H. teegelaari* (Fig. 24) resembles that of *H. mylergates* (see p. 176 and Fig. 29 below) in having a fairly high-vaulted orbital region and a somewhat curved and relatively steeply sloping preorbital profile; the curvature and slope, however, are less marked than in the skulls of *H. pharyngomylus* and *H. ishmaeli* (see Greenwood, 1974 : 73, figs 43 & 65).

The ventral apophysis for the upper pharyngeal bones is stout, with a large articular area in which there is a substantial contribution from the basioccipitals but none from the prootics, at least in the 2 specimens examined (see Fig. 25).

The *lower pharyngeal bone* (Fig. 26) is stout and enlarged with a broad occlusal surface that is markedly concave over its entire area, a feature best seen when the bone is viewed laterally.

The *lower pharyngeal teeth*, except for those in the marginal row and a small cluster in the posterolateral angles of the bone, are enlarged and molariform; the non-molariform teeth are stout and weakly bicuspid.

The level of hypertrophy in the pharyngeal mill of *H. teegelaari* (as measured by the extent and degree of pharyngeal tooth molarization and bone enlargement) is comparable with that seen in *H. ptistes*, *H. ishmaeli* and *H. pharyngomylus*, although some specimens of the latter species do exhibit a slightly greater development of the mill.

The dentary in *H. teegelaari*, when compared with that in *H. pharyngomylus* and *H. ishmaeli*, is relatively shallower and more elongate, in these respects resembling the dentary in *H. obtusidens*, *H. ptistes* and *H. mylergates* (see p. 177 below).

There are 29 (f.11) or 30 (f.10) vertebrae (excluding the fused PU_1 and U_1 centra), comprising 13 (f.20) or 14 (f.1) abdominal and 16 (f.11) or 17 (f.10) caudal elements.

Coloration. The *live colours* of an *adult sexually active male*, see Fig. 27 (BM(NH) reg. no. 1977.1.28:41), are as follows: Body with a purplish grey dorsum, the purple colour more intense anteriorly. Flanks, chest and belly bright red, caudal peduncle yellow with a faint red overlay; traces of 6 vertical bars are visible on the flanks. Dorsum of head grey with a red flush, remainder

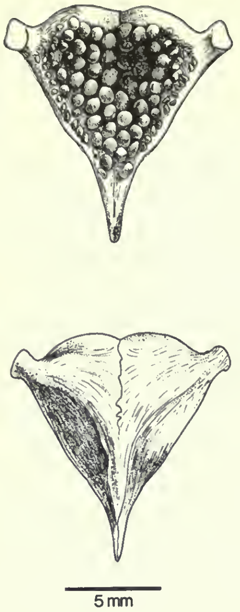

Fig. 26 *Haplochromis teegelaari*. Lower pharyngeal bone in occlusal view (above) and ventral view (below).

of head bright red except for the lower lip and branchiostegal membrane which are white. There is a faint lachrymal bar and a dark bar on the vertical preopercular limb.

Dorsal fin light grey with a faint red flush, dark grey lappets, and red maculae on the soft part of the fin. Anal light red anteriorly, greyish posteriorly; egg dummies (anal ocelli) orange to reddish. Caudal hyaline, yellowish proximally, and with red maculae and streaks. Pelvic fins mostly black, the pectorals hyaline. A second specimen (BM(NH) reg. no. 1977.1.28:40) also a sexually active male, differs slightly in having only 3 vertical bars on the flanks, a faint dark band from the opercular spot to the eye, a brownish-purple dorsum to the head, white ventral aspects of the flanks and a red flush on the otherwise black pelvic fins.

Preserved material. The coloration of *adult males* only is known. The ground colour is a light sandy brown, shading to yellowish-white on the chest and belly, the chest sometimes with a sooty overlay. Five or 6 distinct dark bars extend across the flanks from the dorsal profile almost to

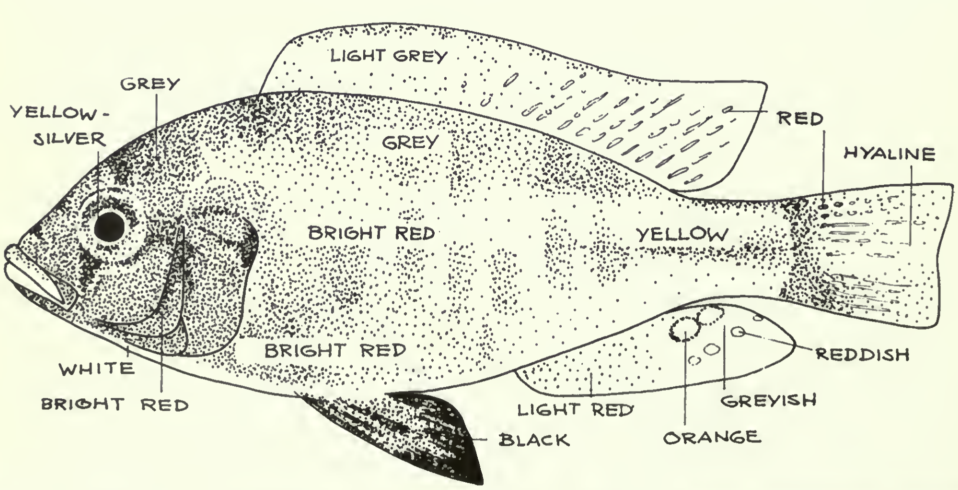

Fig. 27 *Haplochromis teegelaari*. Adult male (sexually active), to show coloration. Drawn by M. J. P. van Oijen.

the ventral outline of the body; immediately above the anal fin two or three bars generally are interconnected midlaterally by a rather ill-defined black blotch. Usually there are two vertical bars on the caudal peduncle, each somewhat broader but less well-defined than those on the flanks. Some specimens have faint indications of a dark midlateral band, especially on the anterior third of the body and again on the caudal peduncle. A faint and frequently interrupted longitudinal band is sometimes visible slightly dorsal to, but following the course of, the upper lateral line.

On the head there are two parallel and well-defined bars crossing the snout; a distinct, and relatively broad, lachrymal stripe extends in some specimens to the level of the maxillary tip, and in others further ventrally onto the lower jaw. Above the eye (and continuing the same line as the lachrymal bar) is a dark stripe which soon expands into a triangular blotch; the blotches of each side meet in the midline (cf. *H. ptistes*, p. 167). In some specimens there is a faint but dark vertical bar on the upper two-thirds of the preoperculum. The operculum itself is silvery.

The dorsal fin is yellowish with black lappets; the caudal fin is also yellowish but with a faint and ill-defined darker centre. The anal varies from hyaline to faint yellow, the pelvics are black, most intensely so over the anterior half of the fin.

ECOLOGY. *Habitat.* The specimens came from three different localities in the Mwanza Gulf (see p. 174). In all three localities, the substrate is mud; at two the depth was *c.* 2 m, and at the third *c.* 8 m.

FOOD. The guts of fishes from all three localities were examined, and gave the following results.

(i) Southern part of Mwanza Gulf near Busissi (*c.* 2 m; mud). Five specimens, all containing fragments of small, unidentifiable bivalve shells, but in 4 fishes a number of fragmented gastropod shells (*Melanoides tuberculata*) as well.

(ii) Coastal waters opposite Mashoro Bay, Mwanza Gulf (*c.* 8 m, mud). One specimen containing a few fragments of bivalve shells (specifically indeterminable).

(iii) Northeast of Buzumu Island, near the southern end of the Mwanza Gulf (*c.* 2 m; mud). Nine specimens, all except one containing a mixture of fragmentary, small and unidentifiable bivalve shells together with fragmentary gastropod shells (*Melanoides* and probably one other species); *Melanoides* remains predominate in most guts. The exceptional fish contained only *Melanoides* shell fragments.

BREEDING. Nothing is known about the breeding habits of *H. teegelaari*. Only males are available for study; all are adult and most show signs of sexual activity.

DIAGNOSIS AND AFFINITIES. The morphological characters distinguishing *H. teegelaari* from *H. ptistes* (see p. 168) are relatively slight and concerned principally with the skull and pharyngeal bones; the two species overlap in all morphometric features.

The degree of enlargement shown by the lower pharyngeal bone in both species is about equal, as is the extent to which the lower pharyngeal dentition is molarized. However, the occlusal surface of the bone is more concave in *H. teegelaari*, and the outline of the bone as seen in occlusal view lacks the small but distinct 'shoulders' immediately posterior to the blade (cf. Figs 26 & 21).

The neurocranium of *H. teegelaari* has a somewhat more vaulted orbit and thus a more steeply sloping and curved dorsal profile to the preorbital region than is the case in *H. ptistes* (cf. Figs 24 & 20).

Another anatomical feature distinguishing the two species is the much longer and more coiled intestine of *H. ptistes* (*c.* 2½ times the standard length, cf. 1½–2 times in *H. teegelaari*).

The most readily diagnostic feature lies in the cephalic markings of preserved specimens. In *H. teegelaari* the supraorbital blotches are clearly triangular, as opposed to rectangular in *H. ptistes. Haplochromis ptistes* also has a prominent midlateral stripe, a feature that is barely visible and is frequently interrupted in those specimens of *H. teegelaari* in which it is present. Regrettably, the live colours of *H. ptistes* are still unknown.

From *H. pharyngomylus* and *H. ishmaeli* (see Greenwood, 1960 : 270–279, figs 19–21), *H. teegelaari* is distinguished by the live coloration of adult males, by its shallower dentary and by its somewhat larger eye (27·0–33·0, M = 30·0% of head, cf. 23·0–31·8, M = 26·5% and 23·0–31·0, M = 27·7% for *H. pharyngomylus* and *H. ishmaeli* respectively). From *H. pharyngomylus*, *Haplochromis teegelaari* is further distinguished by its longer pectoral fin (84·0–103·0, M = 91·0% head, cf. 68·5–91·0, M = 80·0%), and from *H. ishmaeli* by usually having fewer teeth in the outer row of the upper jaw (38–54, modal range 40–44, cf. 38–66, modal range 44–52).

The complete, or almost complete, overlap of *H. teegelaari* with *H. ptistes*, *H. ishmaeli* and *H. pharyngomylus* in all morphometric and meristic characters emphasizes the difficulties encountered in taxonomic work on the Lake Victoria *Haplochromis* species flock. When live specimens are compared, the differences in adult male coloration are striking and diagnostic, and there are also subtle differences in gross morphology which cannot readily be quantified or verbalized. Together, the features of colour and shape enable one to group, quite easily, various individuals into recognizable 'taxa', an action that adds to one's conviction that these assemblages are also biologically valid species.

In most respects *H. teegelaari* seems to be related both to *H. pharyngomylus* and *H. ishmaeli*, and to *H. obtusidens* and *H. ptistes*; in particular this double relationship would seem to be manifest through the specialization expressed in the degree of pharyngeal mill hypertrophy. Similarities in neurocranial shape shared by *H. teegelaari*, *H. ishmaeli* and *H. pharyngomylus* (see above, p. 171) are probably of little value for indicating relationships because, apart from the enlarged ventral apophysis (a correlate of pharyngeal bone hypertrophy), the skull form in all three species departs little from the basic Lake Victoria *Haplochromis* type (see Greenwood, 1974). The supposedly more derived neurocranial shape of *H. ptistes* and *H. obtusidens* could, however, serve to link the two species in a phyletic lineage distinct from the lineage (or lineages) containing *H. teegelaari*, *H. ishmaeli* and *H. pharyngomylus*.

Whether or not, phylogenetically speaking, *H. teegelaari* should be associated with *H. ishmaeli* and *H. pharyngomylus* cannot be established on the basis of any derived characters shared by these three taxa alone. Likewise, there are no apomorph features shared only by *H. teegelaari* and *H. ptistes*, their common apomorph characters being shared also with *H. pharyngomylus* and *H. ishmaeli*.

Thus, for the moment, the phyletic relationships of *H. teegelaari* remain obscure, but with the probability that the species does not share an immediate common ancestor with *H. obtusidens* and *H. ptistes*.

STUDY MATERIAL AND DISTRIBUTION RECORDS

Museum and Reg. No.	Locality	Collector
	TANZANIA	
BM(NH) 1977.1.10:16 (Holotype)	Southern end of Mwanza Gulf, near Busissi (*c.* 2 m)	Anker & Barel
BM(NH) 1977.1.10:17 (Paratype)	Coastal waters opposite Mashoro Bay, Mwanza Gulf (*c.* 8 m)	Anker & Barel
BM(NH) 1977.1.10:18–26 (Paratypes)	Northeast of Buzumu Island, Mwanza Gulf (*c.* 2 m)	Anker & Barel
BM(NH) 1977.1.10:27–38 (Paratypes)	Southern part of Mwanza Gulf, near Busissi (*c.* 2 m)	Anker & Barel

Haplochromis mylergates sp. nov.

HOLOTYPE. An adult male 111·0 mm standard length, from the Speke Gulf west of Nafuba Island, at a depth of *c.* 10–12 m over a mud bottom, BM(NH) reg. no. 1977.1.10:88.

The trivial name (from the Greek, a miller) refers to the extreme hypertrophy of the pharyngeal apparatus and its effects on the molluscan prey of the species.

DESCRIPTION (Figs 28–32). Based on 18 specimens (including the holotype), 102·0–137·0 mm standard length.

Depth of body 38·0–45·0 (M = 42·0%) of standard length, length of head 33·0–37·0 (M = 34·9)%.

Dorsal head profile gently decurved or, less commonly, straight, sloping steeply at an angle of 40–45°, its outline sometimes interrupted by the fairly prominent premaxillary pedicels. The cephalic lateral line pores are enlarged, the supraorbital pore and those on the preorbital bone noticeably so; the lateral line tubules on the preorbital bone, however, are not especially prominent.

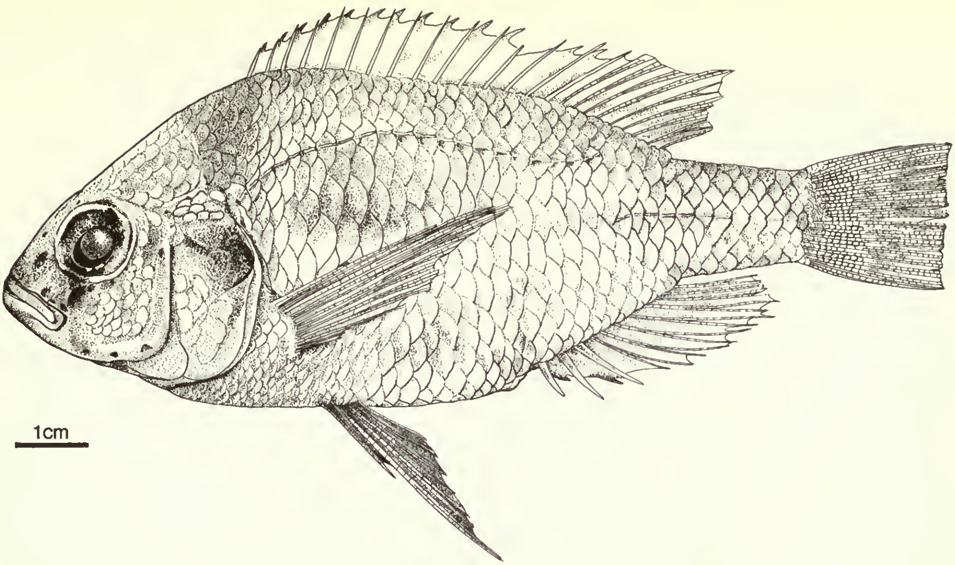

Fig. 28 *Haplochromis mylergates.* Holotype. Drawn by Gordon Howes.

Preorbital depth 12·0–20·0 (M = 16·0) % of head length, interorbital width 26·0–33·0 (M = 29·0) %. Snout as long as broad (modal condition) to 1·2 times longer than broad; when viewed from above, the outline of the snout has a characteristic appearance, narrowing abruptly to form, with the tip of the lower jaw, a relatively acute entry angle (see Fig. 23); length of snout 28·0–33·0 (M = 31·0) % of head. Eye and orbit almost circular, the eye with a definite anterior and anteroventral aphakic aperture; eye diameter 28·0–33·0 (M = 31·0) % of head. Cheek depth 20·0–29·0 (M = 23·0) %.

Caudal peduncle 1·2–1·5 (mode 1·3) times longer than deep, its length 15·0–19·0 (M = 17·0) % of standard length.

Mouth slightly oblique, inclined at an angle of 10–25°. Jaws equal anteriorly, the posterior tip of the maxilla reaching a vertical through the anterior margin of the eye or, less frequently, a little posterior to that level.

Lower jaw 1·3–1·7 (modal range 1·4–1·5) times longer than broad; its length 35·0–43·0 (M = 39·0) % of head.

Gill rakers. 8 (rarely 7 or 10) on the lower limb of the first gill arch, the lowermost 2 or 3 (rarely as many as 5) rakers reduced, the remainder relatively short and stout.

Scales. Ctenoid; lateral line with 31 (f.2), 32 (f.5), 33 (f.8) or 34 (f.2) scales, cheek with 3 (mode) or 4 rows. Six and a half to 7½ (rarely 8, mode 7) scales between the dorsal fin origin and the lateral line, 6½–7½ (rarely 8, mode 7) between the pectoral and pelvic fin bases.

Fins. Dorsal with 23 (f.2) or 24 (f.16) rays, comprising 14 (f.1), 15 (f.12) or 16 (f.5) spinous and 8 (f.5) or 9 (f.13) branched elements. Anal with 11 (f.4), 12 (f.13) or 13 (f.1) rays, comprising 3 spines (4 in one specimen) and 8 (f.5), 9 (f.12) or 10 (f.1) branched rays. The occurrence of 4 anal spines in a species of *Haplochromis* is extremely rare; it is interesting to note that he speciment with 4 anal spines also has the lowest number (14) of dorsal spines. Pectoral fin 86·0–103·0 (M = 92·0) % of head. Pelvic fins with the first branched ray noticeably produced, proportionately more so in males. Caudal truncate, scaled on its proximal half to two-thirds, rarely scaled over somewhat less than the proximal half of the fin.

Teeth. In the *outer series* of the *upper jaw* there is usually a mixture of bi- (or weakly bicuspid) and unicuspid teeth, without any positional predominance of one type over the other; in general, however, the posterior one to three teeth are unicuspid and slightly enlarged. A few specimens have only unicuspids in the outer row, but there is no obvious correlation between body size and the predominance of unicuspids, as is often the case in *Haplochromis* species. The unicuspid teeth are relatively slender but are strong and caniniform, the bicuspids have compressed cylindrical crowns; all the outer teeth are slightly recurved.

There are 44–60 (modal range 50–55) teeth in the outer series of the upper jaw.

Tooth form and arrangement in the *outer row* of the *lower jaw* are similar to those in the upper jaw, but with a tendency for bicuspids to predominate over unicuspids. Those specimens with an entirely unicuspid upper dentition also have only unicuspid teeth in the lower jaw.

In most specimens the *inner tooth rows* of both jaws have an admixture of bi-, tri- and unicuspids with, usually, tricuspids predominating; rarely are only tricuspids found in these series. There are 1 or 2 (rarely 3) rows of inner teeth in both jaws.

Osteology. The *neurocranium* (Fig. 29) of *H. mylergates* closely resembles that of *H. teegelaari*, although the orbital region is somewhat higher and consequently the preorbital dorsal profile slopes more steeply. The ventral pharyngeal apophysis is stout, with a large articulatory surface to which the prootic makes no contribution (at least in the 2 specimens examined).

The *lower pharyngeal bone* (Fig. 30) is very stout, and has a markedly concave occlusal surface, the concavity increasing to almost a broad pit in the centre of the bone. Compared with *H. pharyngomylus* and *H. ishmaeli* (the two other mollusc-crushing species with greatly hypertrophied bones), the lower and upper pharyngeal bones of *H. mylergates* have a much larger surface area (see Fig. 31); as a correlate of this feature, the ventral apophysis on the skull is, relatively speaking, also much enlarged.

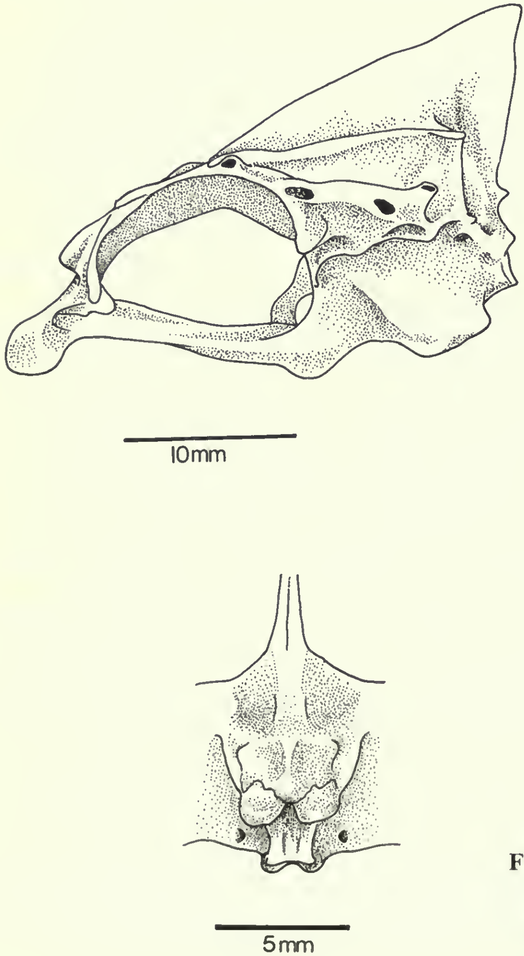

Fig. 29 *Haplochromis mylergates*. Neurocranium in left lateral view (above), and the apophysis for the upper pharyngeal bones (below).

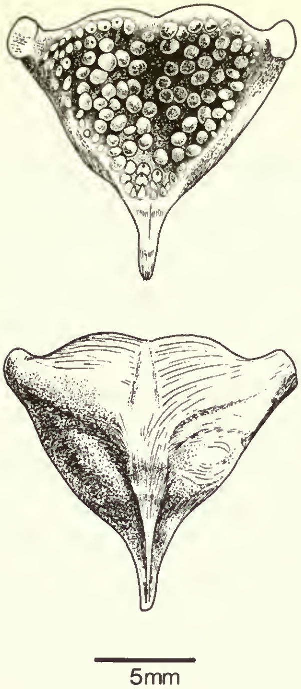

Fig. 30 *Haplochromis mylergates.* Lower pharyngeal bone in occlusal view (above) and ventral view (below).

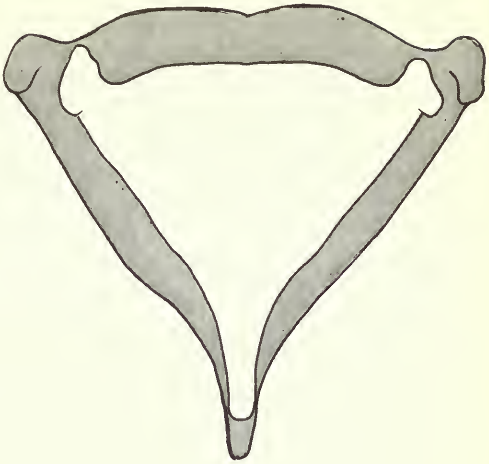

Fig. 31 Outline of the lower pharyngeal bone (in occlusal view) of *H. mylergates* (grey shading), with that of *H. ishmaeli* (in white) superimposed on it. The bones are from a specimen of *H. ishmaeli* 105·0 mm S.L. (28·0 mm neurocranial length), and from a *H. mylergates* 109·0 mm S.L. (29·5 mm neurocranial length).

All the *lower pharyngeal teeth* (Fig. 30), except for a few in the posterolateral angles of the bone and a few in the outer row, are enlarged and molariform; the non-molariform teeth are stout and weakly cuspidate.

As in *H. teegelaari*, the dentary in *H. mylergates* is relatively shallow and elongate when compared with that bone in *H. pharyngomylus* and *H. ishmaeli.*

There are 29 (f.9) or 30 (f.8) vertebrae (excluding the fused PU_1 and U_1 centra), comprising 13 (f.13) or 14 (f.4) abdominal and 16 (f.13) or 17 (f.4) caudal elements.

Coloration. Data on *live colours* are available from an *adult and sexually active male* (BM(NH) reg. no. 1977.1.28:43), see Fig. 32. The body has a red dorsum which darkens posteriorly; the flanks and caudal peduncle are yellow to yellowish-green, becoming white ventrally; the chest and belly are a very light red. The head has a bright red dorsal surface and ethmoidal region; the preorbital region is a light reddish-grey while the cheeks and operculum are yellow with a red overlay. A faint lachrymal stripe is present. The lower jaw and branchiostegal membrane are whitish.

The dorsal fin is red anteriorly, hyaline posteriorly but with red maculae and streaks between the rays. The anal is whitish-grey, with orange egg dummies (ocelli), the caudal hyaline with red streaks and maculae. Pelvic fins are greyish posteriorly, black proximally; the pectorals hyaline with a red flush.

Preserved material. Adult males. The dorsum and the flanks to about the level of the lower lateral line are greyish-sandy to sandy; below this level the flanks, belly and chest are silvery white.

The dorsal surface of the head, excluding the snout, is sandy, the snout (both dorsally and laterally) is greyish. The cheek is silvery grey, the greater part of the opercular region silvery but the upper quarter of the operculum itself is usually darker. There are no traces of markings on the snout, but a weak and often ill-defined lachrymal stripe or blotch is present; generally this mark does not reach ventrally much below the margin of the preorbital bone but in a few specimens it extends (albeit very faintly) to a level slightly below the gape.

The dorsal, caudal and anal fins are greyish-hyaline, and are immaculate. The pelvics are black over about the anterior half of each fin, and variously sooty over the remainder.

Adult females. Only 3 specimens (all apparently spent and quiescent) are available. The body and head coloration is essentially like that of males except that there is no lachrymal bar or blotch. All the fins are hyaline, but there are very faintly sooty lappets to the spinous dorsal, and a light scattering of melanophores on the membrane between the middle few rays of the caudal fin; when the caudal is closed it appears to have a dark midlateral region.

ECOLOGY. *Habitat.* The species is known from three localities in the Speke Gulf (see p. 179). In all, the substrate is mud, and the depth between *c.* 8 and 12 m.

FOOD. Two of the 16 specimens examined were empty, the remainder all contained fragments of mollusc shells in their stomachs and intestines. The gastropod *Melanoides tuberculata* was present in all specimens, usually as the sole or predominant food organism, but in 3 fishes there were, in addition to the snails, a few fragments of bivalve shells (unfortunately too fragmentary to allow further identification).

BREEDING. Nothing is known about the reproductive habits of *H. mylergates*. All the specimens examined are adults, the two largest (128·0 and 137·0 mm S.L.) being females.

DIAGNOSIS AND AFFINITIES. From all other Lake Victoria *Haplochromis* species with a hypertrophied pharyngeal mill, *H. mylergates* is distinguished by the coloration of its adult males and by the relatively greater surface area of its pharyngeal bones; further, the lower pharyngeal bone is more concave than in any other species. The shape, in dorsal view, of the snout outline is also diagnostic (see Fig. 23).

From the 3 species with the most hypertrophied pharyngeal mills (*H. ishmaeli*, *H. pharyngomylus* and *H. teegelaari*), *Haplochromis mylergates* is further distinguished as follows:

(i) From *H. pharyngomylus* (see Greenwood, 1960 : 270, fig. 19) by its slightly deeper body (38·0–45·0, M = 42·0% standard length, cf. 33·8–42·0, M = 38·5%), larger eye, even in specimens of a comparable size or larger (28·0–33·0, M = 31·0% head, cf. 23·0–31·8, M = 26·5%), enlarged cephalic lateral line pores (especially those of the preorbital bone and the pore situated immediately above the eye), longer pectoral fin (86·0–103·0, M = 92·0% head, cf. 68·5–91·0, M = 79·6%) and more numerous teeth in the outer row of the upper jaw (44–60, modal range 50–55, cf. 30–42, mode 36).

(ii) From *H. ishmaeli* (see Greenwood, 1960 : 275, fig. 21) by its larger eye, even in specimens of a comparable size or larger (28·0–33·0, M = 31·0% head, cf. 23·0–31·0, M = 27·7%), by the larger scales on its chest (6½–7½, rarely 8, cf. 8 or 9, rarely 7) and by the enlarged cephalic lateral line pores (again, those on the preorbital bone and that immediately above the eye).

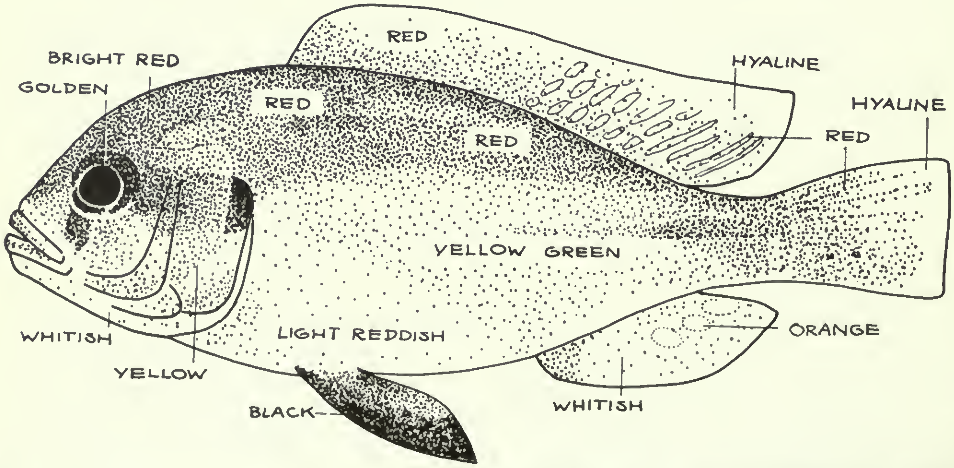

Fig. 32 *Haplochromis mylergates.* Adult male (sexually active), to show coloration. Drawn by M. J. P. van Oijen.

(iii) From *H. teegelaari* (see above, p. 169, Figs 22–27) by the absence of distinct cephalic markings (especially the large supraorbital bars or blotches), the absence of vertical bars on the body of preserved specimens, by the enlarged cephalic lateral line pores and by the presence of rather more teeth in the outer row of the upper jaw (44–60, modal range 50–55, cf. 38–54, modal range 40–44).

As with *H. teegelaari* (see above p. 174) it is difficult to determine the precise phyletic relationships of *H. mylergates*, and for the same reasons: a lack of apomorph characters that are indisputably non-convergent ones. In both species the most obvious apomorph features are connected with the hypertrophy of the pharyngeal mill. Whatever the phyletic relationships of *H. mylergates* may be (that is, either with the *H. obtusidens–H. ptistes* lineage or with the *H. ishmaeli–H. pharyngomylus* one) it must be considered to have the most highly developed pharyngeal mill of all. In terms of its habitat and depth preferences *H. mylergates* does not, however, seem to differ significantly from such species as *H. ishmaeli* and *H. pharyngomylus*, but more data on distribution and, especially, feeding habits are required before this impression is confirmed.

Since *H. mylergates* does not share the derived neurocranial features of *H. obtusidens* and *H. ptistes* it cannot be placed in that lineage. Its specialized features (pharyngeal bone shape and size, see above) in themselves do not allow its addition to the *H. ishmaeli–H. pharyngomylus* lineage with any certainty since these could well be products of convergent evolution. For the moment the species must remain in a phyletic limbo (where it joins a number of other members of the Lake Victoria *Haplochromis* flock).

STUDY MATERIAL AND DISTRIBUTION RECORDS

Museum and Reg. No.	Locality	Collector
	TANZANIA	
BM(NH) 1977.1.10:88 (Holotype)	Speke Gulf, west of Nafuba Island (*c.* 10–12 m)	Anker & Barel
BM(NH) 1977.1.10:89–90 (Paratypes)	Speke Gulf, west of Nafuba Island (*c.* 10–12 m)	Anker & Barel
BM(NH) 1977.1.10:91 (Paratype)	Speke Gulf, midway between Kisoria Point and Nafuba Island (*c.* 8 m)	Anker & Barel
BM(NH) 1977.1.10:92–105 (Paratypes)	Speke Gulf; bay north of Nafuba Island (*c.* 10 m)	Anker & Barel

Acknowledgements

Both the authors are much indebted to the many people who assisted with the field work in Tanzania; in particular we wish to thank Dr G. K. Libaba, Director of Fisheries, Tanzania, whose generous help, enthusiasm and hospitality greatly aided the work of Drs Anker and Barel. We must also thank Dr J. Okedi, Director of E.A.F.F.R.O., Jinja, and the members of the U.N.D.P. team who helped the senior author during his work on Lake Victoria in 1970 (the full results of which will be published in the next part of this revision). Dr L. B. Mkwizu (then acting principal of the Freshwater Fisheries Institute, Nyegezi) and ir. H. Bon, are to be thanked for the unstinted help they gave to Drs Anker and Barel.

We also have much pleasure in thanking our colleagues at the British Museum (Natural History) and the Zoology Department of Leiden University for their help at various stages in the preparation of this paper. In particular we thank Mr Gordon Howes (who has provided all the anatomical illustrations, and a great deal of assistance in innumerable other ways), Mr C. Elzenga who drew the figure of *H. teegelaari* and Mr M. J. P. van Oijen who made all the other illustrations of whole fishes used in this paper, except Fig. 28.

The senior author is greatly indebted to Professor Pieter Dullemeijer of Leiden University for the hospitality and facilities he has given him on numerous visits to the Zoology Department there.

Finally, the junior author would express his gratitude to the Netherlands Foundation for the Advancement for Tropical Research (WOTRO) for their generous financial aid which enabled

him and Dr Anker to visit Tanzania and thus collect the data and material on which much of this paper is based.

Appendix: The live coloration of certain previously described *Haplochromis* species

M. J. P. van Oijen
Leiden University

No information was available on the live colours of several *Haplochromis* species described, or redescribed, in previous parts of this revision. Live coloration, especially that of adult male fishes, is an important diagnostic character (see Greenwood, 1974), and is often the easiest and most reliable character on which to base preliminary field identifications (especially when the worker is faced with several hundreds of specimens recently caught in a trawl or seine net); it is also an important biological feature in this closely related species flock.

For these reasons it is essential that colour descriptions should be available for all known species. With this objective in view Drs Anker and Barel took data on live colours not only from the new taxa they collected but also from those species whose coloration was previously unknown or was inadequately documented.

Live specimens were chosen from the catch and immediately photographed (using Kodachrome film) in a cuvette especially made for this purpose. The descriptions given below are based principally on the resulting colour transparencies. One set of transparencies, together with the preserved bodies of the fishes photographed, are now deposited in the British Museum (Natural History); the register number for the specimen is quoted (together with the fish's standard length, sexual state and its locality) as part of each description.

Since the colour descriptions previously published by Greenwood were also based on recently captured specimens, it is thought that emotional factors which could influence colours and colour patterns should be similar to those affecting the specimens described here. However, it should be borne in mind that Greenwood's data were derived from specimens held in air, and were taken from direct observations on the fishes and not from photographs. Another difference that should be noted is the fact that Greenwood's descriptions were compounded from several specimens (albeit ones at a similar stage of sexual development), and sometimes from fishes caught at different localities. The descriptions that follow are each based on a single specimen.

An annotated figure (the outline based on a drawing previously published with the species' description) accompanies each account of coloration. The drawing shows the pattern of body and cephalic markings, and the prominent colours for various parts of the body and fins. The pectoral fin is omitted so as not to obscure details of coloration on the anterior region of the body; notes on pectoral fin coloration are given in the description.

In the descriptions, the number of egg dummies (anal ocelli) refers to the individual described, but it must be realized that the number does show marked intraspecific variability.

Haplochromis serranus (Pfeffer), 1896

see Greenwood (1962 : 152)

Adult ♂, S.L. 182·0 mm (BM(NH) 1977.1.28:28). Fig. 33.

LOCALITY. Mwanza Gulf, depth 7 m, mud bottom.

MARKINGS. Lachrymal stripe and faint opercular blotch.

COLORATION. *Head*. Except for the whitish lips, grey-blue. *Eye*. Iris bluish, inner ring yellow. *Body*. Dorsum, chest and belly grey-blue. Flank yellow-green with three small orange spots, one just above the operculum, the others above the anal and pelvic fins. Caudal peduncle greyish dorsally and greenish ventrally. *Fins*. Dorsal, pectoral and pelvic fins grey-blue. Anal dark red, with orange egg dummies. Caudal very dark proximally and somewhat lighter grey distally, with a faint red flush and dark spots between the rays.

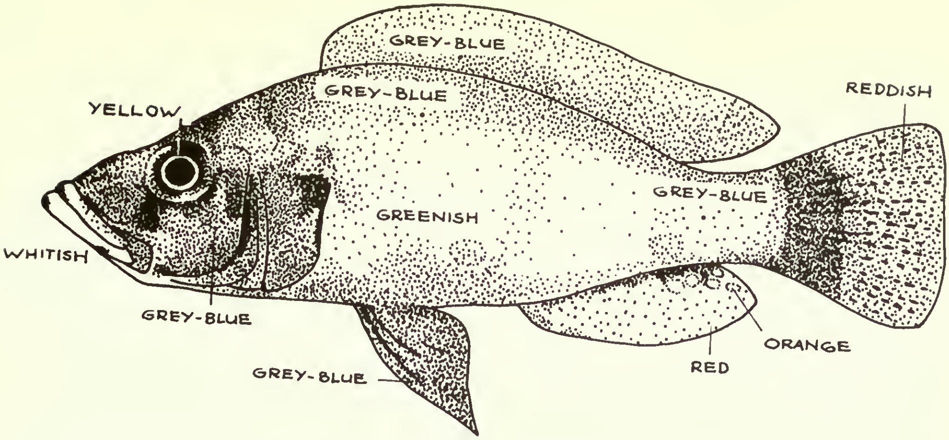
GREY-BLUE
GREY-BLUE
REDDISH
YELLOW
GREY-BLUE
GREENISH
WHITISH
GREY-BLUE
ORANGE
RED
GREY-BLUE

Fig. 33 *Haplochromis serranus.* Adult male.

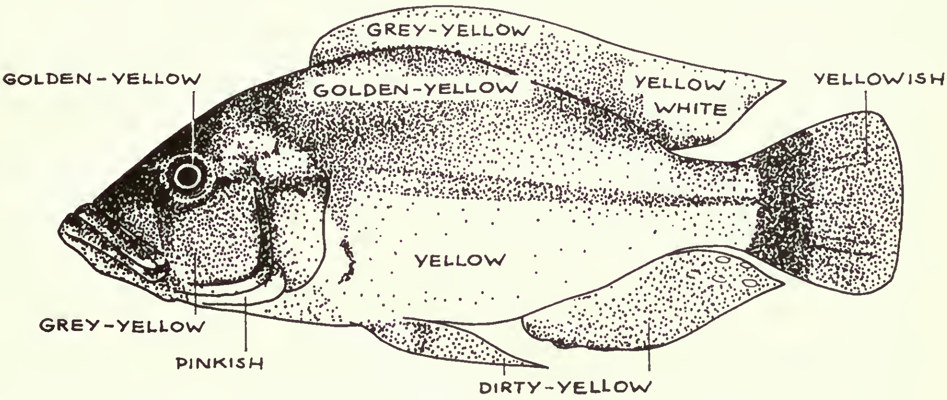
GREY-YELLOW
GOLDEN-YELLOW
GOLDEN-YELLOW
YELLOW
WHITE
YELLOWISH
YELLOW
GREY-YELLOW
PINKISH
DIRTY-YELLOW

Fig. 34 *Haplochromis spekii.* Female, sexually active.

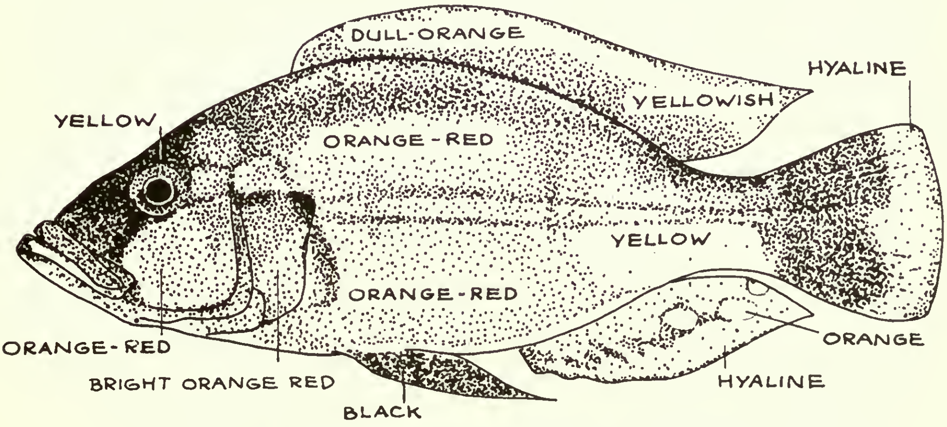
DULL-ORANGE
HYALINE
YELLOWISH
YELLOW
ORANGE-RED
YELLOW
ORANGE-RED
ORANGE
ORANGE-RED
HYALINE
BRIGHT ORANGE RED
BLACK

Fig. 35 *Haplochromis spekii.* Male, sexually active.

Haplochromis spekii (Boulenger), 1906

see Greenwood (1967 : 32)

Adult ♀ sexually active, S.L. 204·0 mm (BM(NH) 1977.1.28:30). Fig. 34.

LOCALITY. Mwanza Gulf.

MARKINGS. Faint midlateral band, proximal half of caudal fin very dark.

COLORATION. *Head.* Lips, preorbital area and dorsal head surface very dark; cheek and operculum greyish-yellow, branchiostegal membrane white-yellow. *Eye.* Iris dark, inner ring bright yellow. *Body.* Dorsum dark greyish-golden; ventral part of body golden yellow. *Fins.* Dorsal dirty yellow-grey with a darker base. Pectorals hyaline with dark rays. Pelvics yellow-grey. Anal yellow-grey with five very faint yellow spots. Caudal very dark grey proximally, dark grey distally.

Adult ♂ sexually active, S.L. 183·0 mm (BM(NH) 1977.1.28:29). Fig. 35.

LOCALITY. Mwanza Gulf.

MARKINGS. Faint double midlateral band and a faint vertical bar above the origin of the anal fin.

COLORATION. *Head.* Preorbital region and dorsal head surface dark. Upper lip dark red. Cheek light orange-red dorsally, white ventrally. Operculum bright orange-red. Lower lip, lower jaw, horizontal arm of the preoperculum, and branchiostegal membrane whitish. *Eye.* Iris blackish, inner ring yellow. *Body.* Dorsum dark, somewhat orange dorsally. Flank, chest and belly bright orange-red. Ventral aspect of the flank whitish. Caudal peduncle yellow. *Fins.* Dorsal dull orange, the soft part yellowish distally. Pectorals hyaline with dark rays. Pelvics sooty. Anal hyaline with a very faint red flush and some grey patches; two orange egg dummies with grey margins. Caudal dark grey proximally, hyaline distally.

Haplochromis microdon (Boulenger), 1906

see Greenwood (1959 : 200)

Adult ♂, sexually active, S.L. 88·0 mm (BM(NH) 1977.1.28:25). Fig. 36.

LOCALITY. Mwanza Gulf, depth 8 m, mud bottom.

MARKINGS. Faint lachrymal stripe, distinct opercular blotch, broad midlateral band and faint traces of a dorsal band.

COLORATION. *Head.* Dark grey, the posterior cheek margin darker still. *Eye.* Iris greyish, inner ring coppery. *Body.* Dorsum and dorsal part of the caudal peduncle yellowish grey; anterior part of the flank coppery, posterior part and caudal peduncle green. *Fins.* Dorsal grey, with a thin red margin and a green flush distally on the soft part only. Pectorals hyaline, pelvics black. Anal with a red flush, two red egg dummies. Caudal dark brownish proximally, with a purple flush distally, its margin and the distal angles red.

Adult ♂, sexually active, S.L. 92·0 mm (BM(NH) 1977.1.28:26). Fig. 37.

LOCALITY. Speke Gulf, depth 8 m, mud bottom.

MARKINGS. Very faint lachrymal stripe. Midlateral band interrupted half way; four faint vertical bars on the flank.

COLORATION. *Head.* Very dark brown except for the whitish ventral region, and the posteroventral part of the operculum which is reddish. *Eye.* Iris very dark, inner ring ivory pink. *Body.* Dorsum dark brown. Dorsal flank brown anteriorly, green posteriorly. Ventral part of the body anterior to the anal fin red. Caudal peduncle green, ventral aspect white. *Fins.* Dorsal dark grey with a brown flush. Pectorals hyaline with dark rays. Pelvics black. Anal red but greyish around the red egg dummies which have black margins. Caudal dark brown proximally, grey distally with red posterior and ventral margins.

Adult ♀, sexually active, S.L. 100·0 mm (BM(NH) 1977.1.28:27). Fig. 38.

LOCALITY. Mwanza Gulf, depth 8 m, mud bottom.

MARKINGS. Opercular blotch, five vertical bars on the flanks.

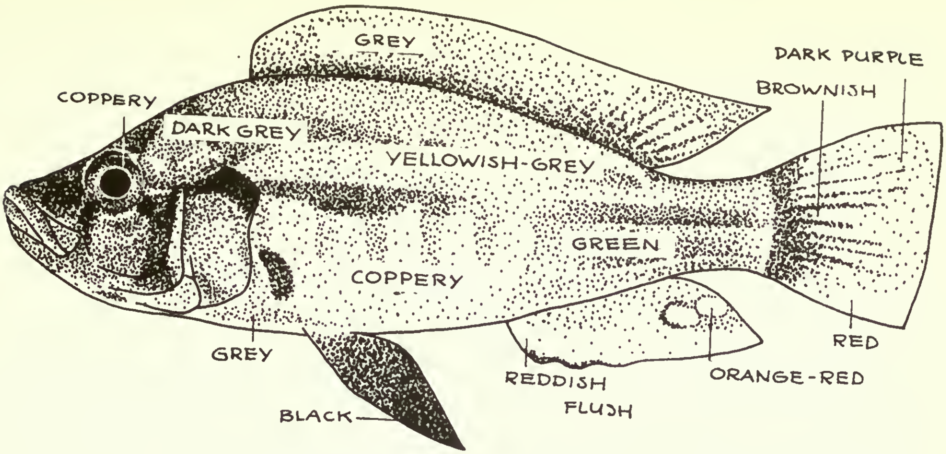
GREY
DARK PURPLE
COPPERY
BROWNISH
DARK GREY
YELLOWISH-GREY
GREEN
COPPERY
GREY
RED
REDDISH
ORANGE-RED
FLUSH
BLACK

Fig. 36 *Haplochromis microdon.* Male, sexually active.

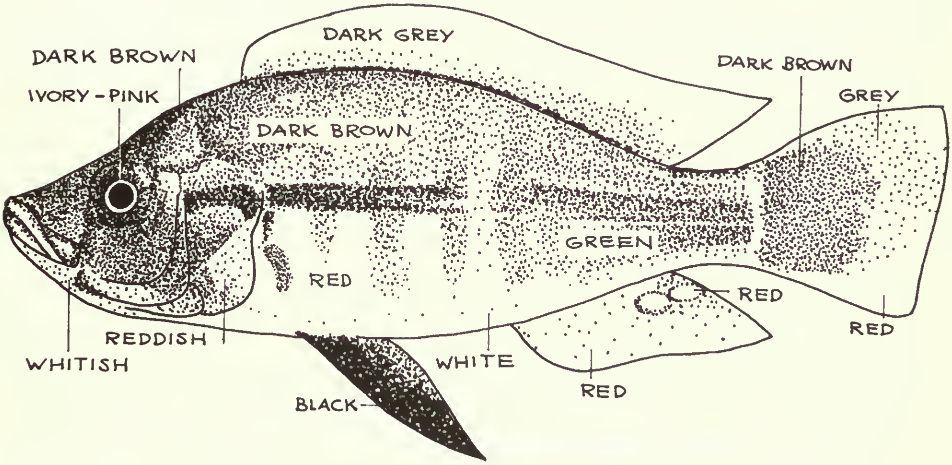
DARK GREY
DARK BROWN
DARK BROWN
IVORY-PINK
GREY
DARK BROWN
GREEN
RED
RED
REDDISH
RED
WHITISH
WHITE
RED
BLACK

Fig. 37 *Haplochromis microdon.* Male, sexually active.

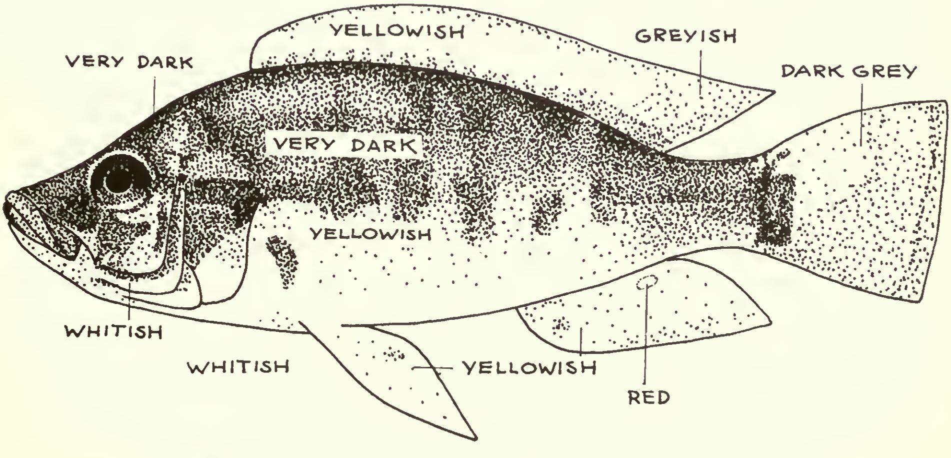
YELLOWISH
GREYISH
VERY DARK
DARK GREY
VERY DARK
YELLOWISH
WHITISH
WHITISH
YELLOWISH
RED

Fig. 38 *Haplochromis microdon.* Female, sexually active.

COLORATION. *Head.* Very dark except for the ventral part of the operculum, part of the cheek and the branchiostegal membrane which are whitish. *Eye.* Iris dark, inner ring light ventrally. *Body.* Dorsum and upper flank very dark, central part of flank yellowish. Whitish ventrally. *Fins.* Dorsal yellowish, faintly red between the rays; lappets and soft part greyish. Pectorals hyaline with dark rays. Pelvics yellowish. Anal yellowish with one red spot. Caudal dark grey with a dark base and dark spots between the rays.

Haplochromis macrognathus Regan, 1922

see Greenwood (1962 : 183)

Adult ♂, sexually active, S.L. 131·0 mm (BM(NH) 1977.1.28:16). Fig. 39.

LOCALITY. Mwanza Gulf, depth 2 m, mud bottom.

MARKINGS. Thin and very faint midlateral band, faint opercular blotch and lachrymal stripe.

COLORATION. *Head.* Lips, ethmoid region and the area dorsal to the eye grey. Preorbital region, cheek and operculum metallic blue-grey, somewhat pinkish ventrally. Branchiostegal membrane black. *Eye.* Iris greyish, inner ring whitish. *Body.* Dorsum grey. Flank and caudal peduncle greyish, flecked with light blue, light green and pink. Chest and belly pinkish-grey, a green sheen just ventral to the pectoral fin base. *Fins.* Dorsal grey proximally, distal part hyaline with darker patches between the rays. Pectorals hyaline. Pelvics black. Anal proximally and anteriorly dark red, distally faintly red, with two orange egg dummies. Caudal with a brownish base shading to grey distally; some fin rays black proximally.

Adult ♀, sexually active, S.L. 152·0 mm (BM(NH) 1977.1.28:18). Fig. 40.

LOCALITY. Mwanza Gulf, depth 8 m, mud bottom.

MARKINGS. Distinct midlateral band, beginning at the anterior opercular margin and terminating on the proximal part of the caudal fin; a dorsal lateral band is also present.

COLORATION. *Head.* Lips and ethmoid region dark sandy. Preorbital area, cheek and operculum dark grey-silver. Branchiostegal membrane yellowish, rest of head greyish. *Eye.* Iris sandy, inner ring golden. *Body.* Dorsum, flank and caudal peduncle yellowish-silver, becoming grey dorsally. Chest, belly and ventral aspect of caudal peduncle white. *Fins.* Dorsal, yellow proximally, hyaline distally. Pectorals hyaline. Pelvics and anal yellow, the anal with two small and light orange spots. Caudal dark yellow grey proximally and hyaline distally.

Adult ♀, sexually active, S.L. 165·8 mm (BM(NH) 1977.1.28:17). Fig. 41.

LOCALITY. Mwanza Gulf, depth 7 m, mud bottom.

MARKINGS. Broad midlateral band and narrower dorsal band, midlateral band continued faintly onto the operculum, and terminating on the proximal part of the caudal fin. Faint mental spot.

COLORATION. *Head.* Preorbital region and the area dorsal to the eye sandy; rest of head silver. *Eye.* Iris silverish, inner ring yellowish. *Body.* Silver. *Fins.* Dorsal and pectorals hyaline, pelvics and anal yellow, the anal with two small yellow spots. Caudal faintly yellow proximally, hyaline distally.

Haplochromis longirostris (Hilg.), 1888

see Greenwood (1962 : 171)

Adult ♂, sexually active, S.L. 124·0 mm (BM(NH) 1977.1.28:31). Fig. 42.

LOCALITY. Mwanza Gulf, depth 2 m, mud bottom.

MARKINGS. Faint lachrymal stripe; three faint vertical bars on the flank.

COLORATION. *Head.* Lips, preorbital region and dorsal head surface yellow. Cheek and dorsal part of the operculum silver, rest of head white. *Eye.* Iris silvery, inner ring faint yellow. *Body.* Dorsal aspect yellow, ventral aspect silvery-white. *Fins.* Dorsal yellow, posterodorsal angle of soft part hyaline. Pectorals translucent with a yellow flush. Pelvics black. Anal white with two bright red egg dummies. Caudal yellowish proximally, hyaline and maculate distally, the rays black.

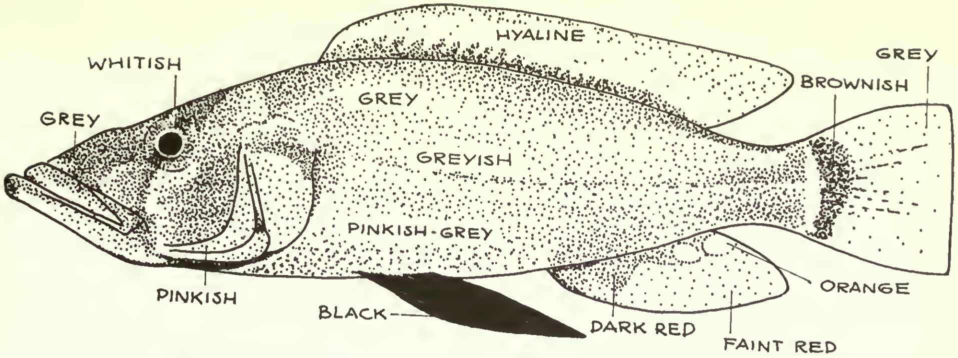
HYALINE
WHITISH
GREY
GREY
BROWNISH
GREY
GREYISH
PINKISH-GREY
ORANGE
PINKISH
BLACK
DARK RED
FAINT RED

Fig. 39 *Haplochromis macrognathus*. Male, sexually active.

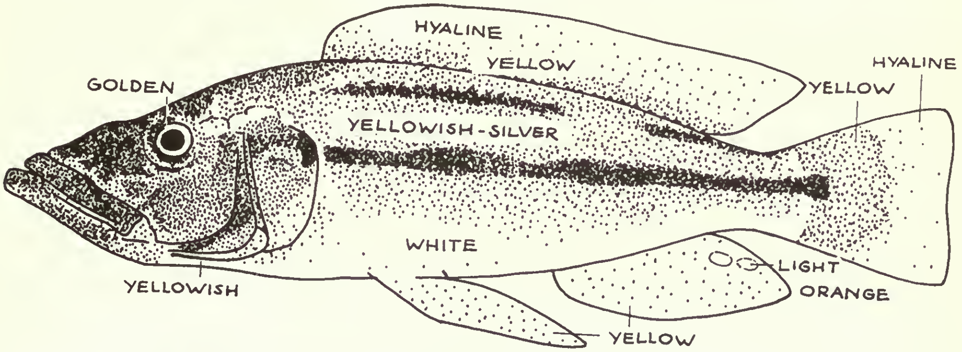
HYALINE
YELLOW
HYALINE
GOLDEN
YELLOW
YELLOWISH-SILVER
WHITE
LIGHT
ORANGE
YELLOWISH
YELLOW

Fig. 40 *Haplochromis macrognathus*. Female, sexually active.

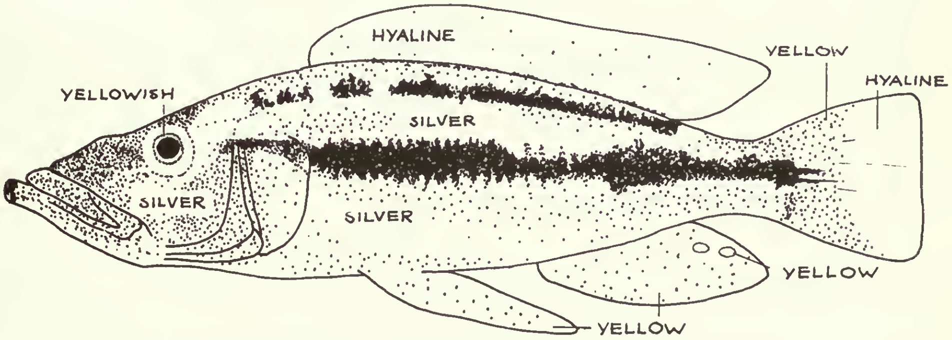
HYALINE
YELLOW
HYALINE
YELLOWISH
SILVER
SILVER
SILVER
YELLOW
YELLOW

Fig. 41 *Haplochromis macrognathus*. Female, sexually active.

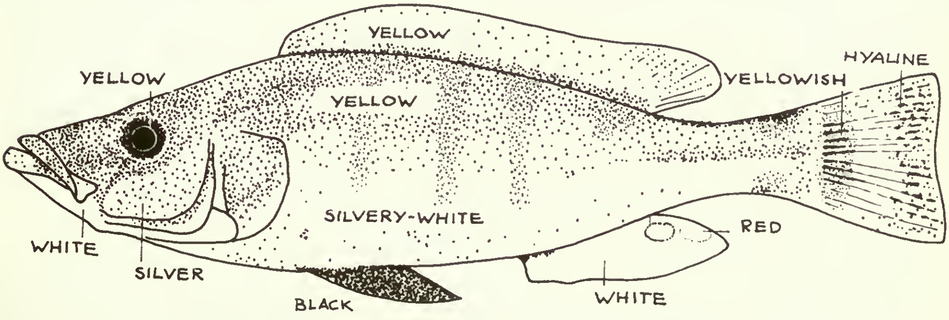
YELLOW
HYALINE
YELLOW
YELLOWISH
YELLOW
SILVERY-WHITE
RED
WHITE
SILVER
BLACK
WHITE

Fig. 42 *Haplochromis longirostris*. Male, sexually active.

Haplochromis paraguiarti Greenwood, 1967

see Greenwood (1967 : 69)

Adult ♂, sexually active, S.L. 107·0 mm (BM(NH) 1977.1.28:9). Fig. 43.

Locality. Mwanza Gulf, depth 2 m, sand bottom.

Markings. Very faint traces of a lachrymal stripe continued through the eye; an opercular blotch; and six vertical bars on the flank.

Coloration. *Head.* Grey, darker dorsally, with an overall red flush. An iridescent blue-green stripe passes along the lower lip to the preoperculum. *Eye.* Iris black, inner ring yellowish. *Body.* Dorsum dark grey with some coppery patches immediately below the dorsal fin and dorsal to the operculum. Chest and belly sooty. Remainder of body grey. Some green spots on the flank. *Fins.* Dorsal grey with a faint green flush over the spinous part, and reddish soft rays. Pectorals with a red flush. Pelvics black. Anal reddish-grey, but sooty anteriorly; four muddy orange egg dummies with grey margins. Caudal reddish-grey.

Haplochromis percoides (Boulenger), 1915

see Greenwood (1962 : 189)

Adult ♀, sexually active, S.L. 83 mm (BM(NH) 1977.1.28:11). Fig. 44.

Locality. Mwanza Gulf, depth 1 m, mud and sand bottom.

Markings. Faint lachrymal stripe. Four vertical bars on the flank (two distinct, broad bands and two fainter ones).

Coloration. *Head.* Uniformly brown except for the yellow branchiostegal membrane. *Eye.* Iris black, inner ring orange. *Body.* Dorsum orange-yellow to brown, flanks greyish-yellow. Caudal peduncle greyish-yellow, darker dorsally. *Fins.* Dorsal grey-yellow with clear maculae. Pectorals hyaline. Pelvics yellow with black streaks between some rays, and also distally. Anal yellow with one orange spot. Caudal yellow with an orange flush and clear maculae.

Haplochromis apogonoides Greenwood, 1967

see Greenwood (1967 : 105)

Adult ♂, sexually active, S.L. 151·0 mm (BM(NH) 1977.1.28:8). Fig. 45.

Locality. Mwanza Gulf, depth 11 m, mud bottom.

Markings. Very faint lachrymal stripe.

Coloration. *Head.* Brown, dark spots on the branchiostegal membrane. *Eye.* Iris bluish dorsally, inner ring light. *Body.* Brown dorsum with an orange flush, but bright yellow-green flanks. Ventral aspect of body brown. Caudal peduncle brown dorsally, greyish ventrally. *Fins.* Dorsal brown with a black margin on the spinous part and bright red maculae on the soft part. Pectorals hyaline. Pelvics black except for a bright red region on the posterior margin. Anal bright red with five orange egg dummies, the area surrounding the egg dummies hyaline. Caudal dark proximally, bright red distally, maculate dorsally.

Haplochromis dichrourus Regan, 1922

see Greenwood (1967 : 65)

Adult ♂, sexually active, S.L. 115·0 mm (BM(NH) 1977.1.28:32). Fig. 46.

Locality. Mwanza Gulf, depth 2 m, mud bottom.

Markings. Distinct lachrymal stripe, continued above the eye.

Coloration. *Head.* Mental region, lips and preorbital region green, ethmoid region pinkish. Dorsal head surface and dorsal part of operculum very dark red. Cheek and operculum very dark grey with a pink flush. Branchiostegal membrane black. *Eye.* Iris black, inner ring golden.

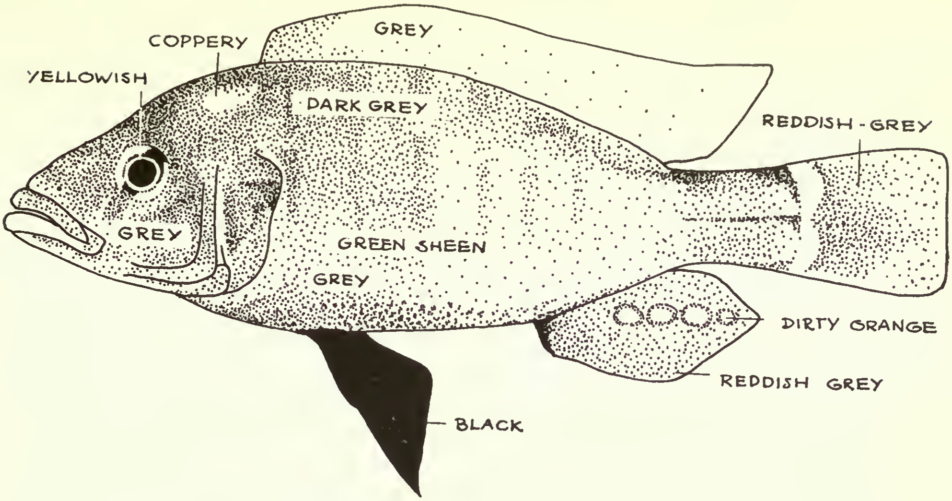
COPPERY
GREY
YELLOWISH
DARK GREY
REDDISH - GREY
GREY
GREEN SHEEN
GREY
DIRTY ORANGE
REDDISH GREY
BLACK

Fig. 43 *Haplochromis paraguiarti*. Male, sexually active.

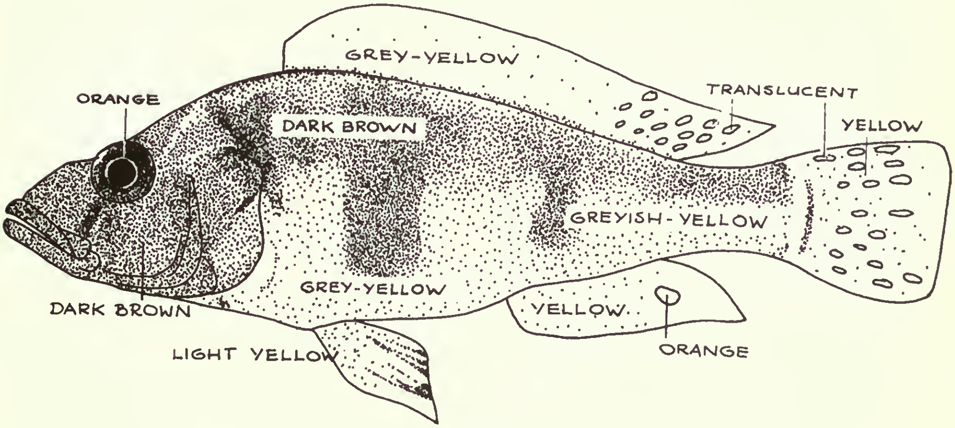
GREY-YELLOW
ORANGE
TRANSLUCENT
DARK BROWN
YELLOW
GREYISH - YELLOW
GREY-YELLOW
DARK BROWN
YELLOW
LIGHT YELLOW
ORANGE

Fig. 44 *Haplochromis percoides*. Female, sexually active.

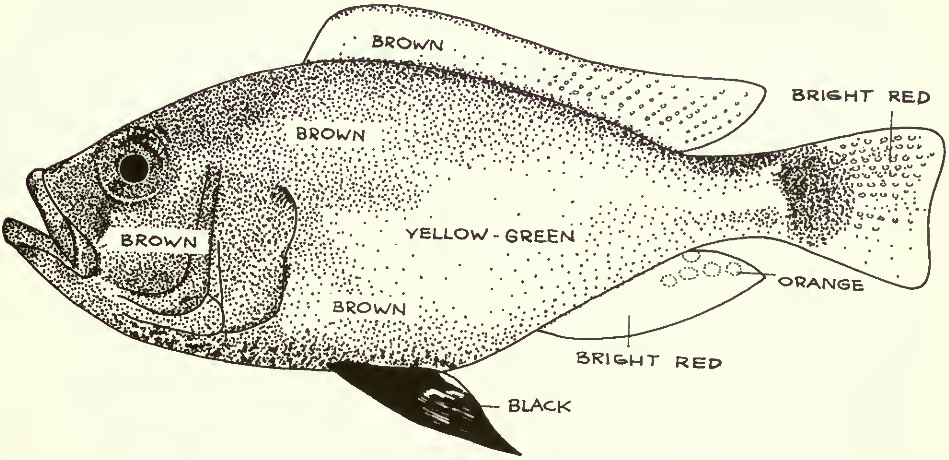
BROWN
BRIGHT RED
BROWN
BROWN
YELLOW - GREEN
ORANGE
BROWN
BRIGHT RED
BLACK

Fig. 45 *Haplochromis apogonoides*. Male, sexually active.

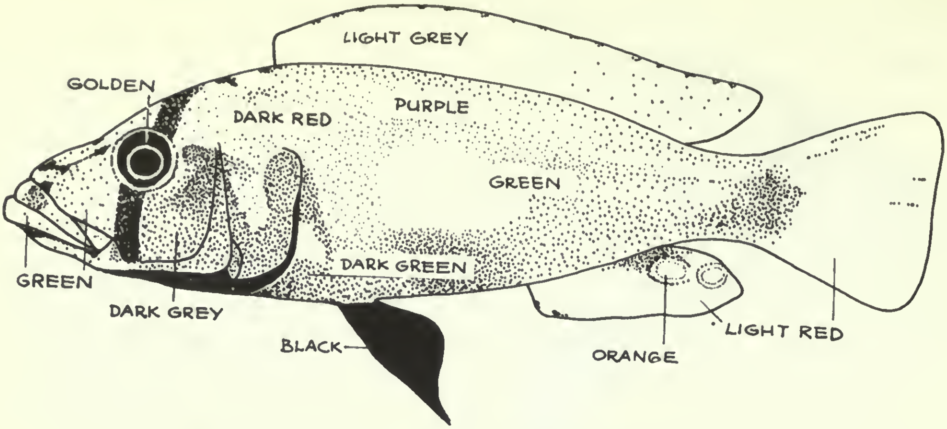
LIGHT GREY
GOLDEN
DARK RED
PURPLE
GREEN
GREEN
DARK GREEN
DARK GREY
BLACK
ORANGE
LIGHT RED

Fig. 46 *Haplochromis dichrourus.* Male, sexually active.

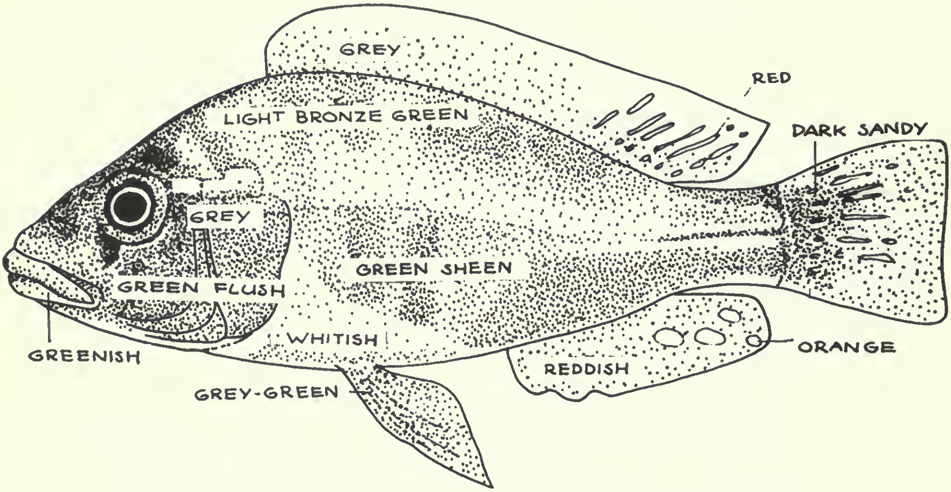
GREY
RED
LIGHT BRONZE GREEN
DARK SANDY
GREY
GREEN SHEEN
GREEN FLUSH
GREENISH
WHITISH
ORANGE
REDDISH
GREY-GREEN

Fig. 47 *Haplochromis riponianus.* Male, sexually quiescent.

Body. Dorsum anteriorly intense dark red, purple posteriorly. Flank light iridescent green, darker posteriorly. Chest and belly dark green to black. Caudal peduncle dark green ventrally, purple dorsally. *Fins.* Dorsal light grey, with a red flush anteriorly. Pectorals hyaline. Pelvics black. Anal light red, more intensely so anteriorly. Two orange egg dummies with a light inner, and grey to black outer margin. Caudal light red ventrally, grey with a red flush dorsally.

Haplochromis riponianus (Boulenger), 1911

see Greenwood (1960 : 252)

Adult ♂, quiescent, S.L. 104·0 mm (BM(NH) 1977.1.28:22). Fig. 47.

LOCALITY. Mwanza Gulf.

MARKINGS. Very faint lachrymal stripe, and traces of two vertical bars on the flank.

COLORATION. *Head.* Uniformly grey with a green flush on the cheek and the operculum. Lips light greenish, a lighter patch behind the eye. *Eye.* Iris black. *Body.* Dorsum, flank and caudal peduncle light bronze green, the caudal peduncle darkest. A green sheen on the flank; chest and belly pinkish-white. *Fins.* Dorsal grey with a red flush and red spots between the soft rays. Pectorals hyaline. Pelvics grey-green. Anal with a dark red flush and three orange egg dummies. Caudal dark sandy with dull red spots between the rays.

Adult ♂, quiescent, S.L. 91·0 mm (BM(NH) 1977.1.28:20). Fig. 48.

LOCALITY. Mwanza Gulf, depth 2 m, mud and sand bottom.

MARKINGS. Faint lachrymal stripe continued through the eye; five faint vertical bars on the flank and a faint midlateral band caudally.

COLORATION. *Head.* Lips and preorbital region grey with a faint orange flush; remainder of head grey with a green flush which is most distinct on the cheek and the operculum. *Eye.* Iris greyish but black dorsally, inner ring yellow. *Body.* Dorsum and caudal peduncle grey, flank green-grey with a green flush over the vertical bars. Ventral body grey-white. *Fins.* Dorsal, pectorals and pelvics light grey. Anal hyaline with a very faint red flush; four orange egg dummies, some with a faint grey outline. Caudal grey with a faint brown flush and red to dark maculae.

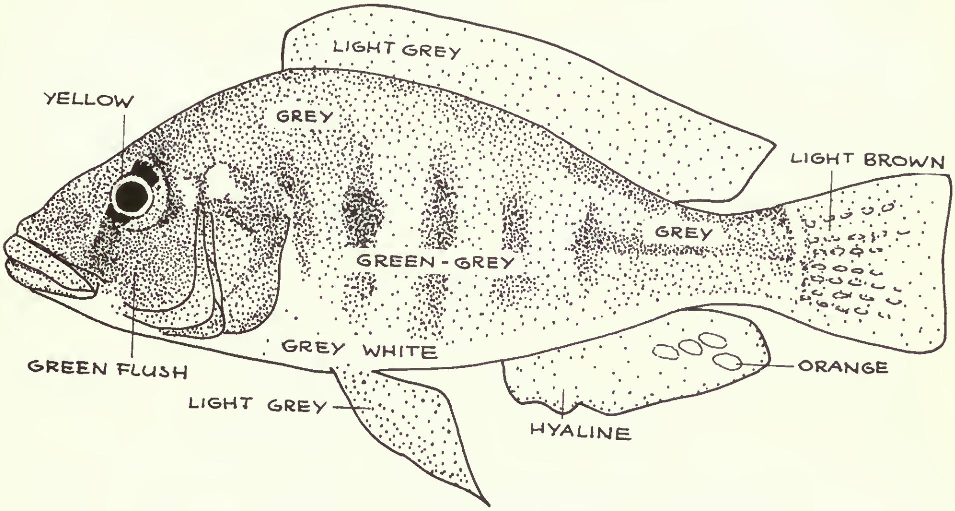
LIGHT GREY
YELLOW
GREY
LIGHT BROWN
GREY
GREEN - GREY
GREY WHITE
GREEN FLUSH
ORANGE
LIGHT GREY
HYALINE

Fig. 48 *Haplochromis riponianus.* Male, sexually quiescent.

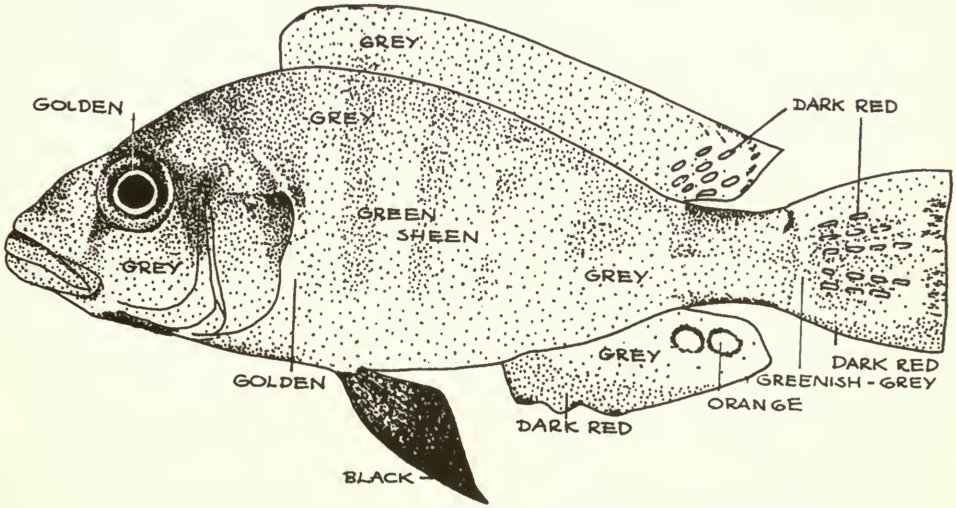
GREY
GOLDEN
GREY
DARK RED
GREEN SHEEN
GREY
GREY
GREY
DARK RED
GREENISH - GREY
GOLDEN
ORANGE
DARK RED
BLACK

Fig. 49 *Haplochromis riponianus.* Male, sexually active.

Adult ♂, sexually active, S.L. 94·0 mm (BM(NH) 1977.1.28:21). Fig. 49.

Locality. Mwanza Gulf, depth 2 m, mud and sand bottom.

Markings. Faint lachrymal stripe and traces of five vertical bars on the flank.

Coloration. *Head*. Dorsally, and posterior to the eye, dark grey with a silvery area between these regions. Rest of head grey. *Eye*. Iris black dorsally and dark grey ventrally, inner ring golden. *Body*. Grey with green iridescent scales on the flank. *Fins*. Dorsal grey, dark red basally and some red maculae on the soft part. Pectorals hyaline, with thin black streaks; pelvics black. Anal dark red anteriorly and distally, grey posteriorly; two orange egg dummies with black margins. Caudal greenish-grey proximally, becoming reddish distally; fin rays green. Part of the caudal margin is black.

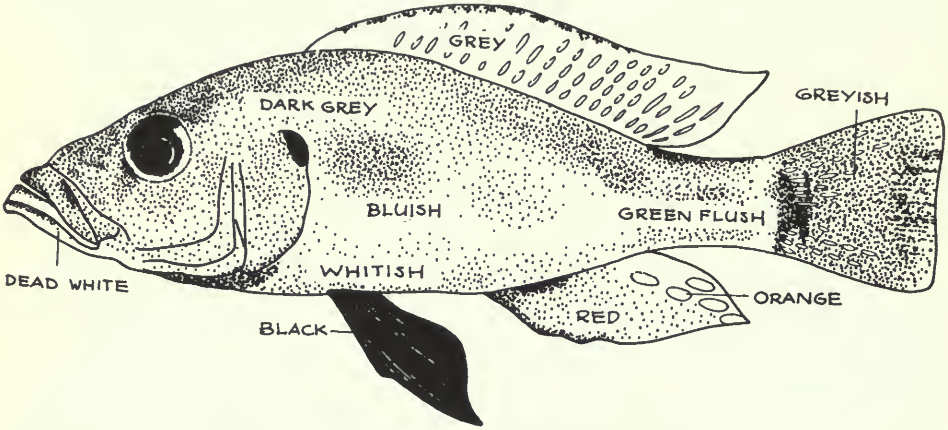

Fig. 50 *Haplochromis arcanus.* Male, sexually active.

Haplochromis arcanus Greenwood & Gee, 1969

see Greenwood & Gee (1969 : 52)

Adult ♂, sexually active, S.L. 134·0 mm (BM(NH) 1977.1.28:77). Fig. 50.

Locality. Speke Gulf, depth 26 m, mud bottom.

Markings. A small opercular blotch.

Coloration. *Head*. Preoperculum and dorsal part of head dark grey with a pink flush, cheek and operculum dark grey with a green flush. Lower jaw dead white. Branchiostegal membrane blackish. *Body*. Dorsum dark grey, flank bluish with two darker blue spots, one just behind the opercular blotch and other above the anal fin; chest and belly greyish. Caudal peduncle grey with an overlying green flush. *Fins*. Dorsal grey, with black lappets and red maculae. Pectorals greyish. Pelvics black. Anal red, the anterior half of the distal margin black, hyaline around the five orange egg dummies. Caudal greyish with a black base, red maculae and a sooty distal part.

Haplochromis lacrimosus (Boulenger), 1906

see Greenwood (1960 : 230)

Adult ♂, quiescent, S.L. 79·0 mm (BM(NH) 1977.1.28:19). Fig. 51.

Locality. Mwanza Gulf, depth 1 m, mud and sand bottom.

Markings. Lachrymal stripe, traces of seven vertical bars on the flank and two on the caudal peduncle, dark blotches on cheek and operculum.

Coloration. *Head*. Grey, with a red-brown flush on the dorsal part; branchiostegal membrane whitish. Lower jaw reddish, lower lip iridescent blue-green. *Eye*. Iris dark grey, inner ring light golden. *Body*. Dorsum red-brown anteriorly, yellowish-brown posteriorly. Flank and belly dull

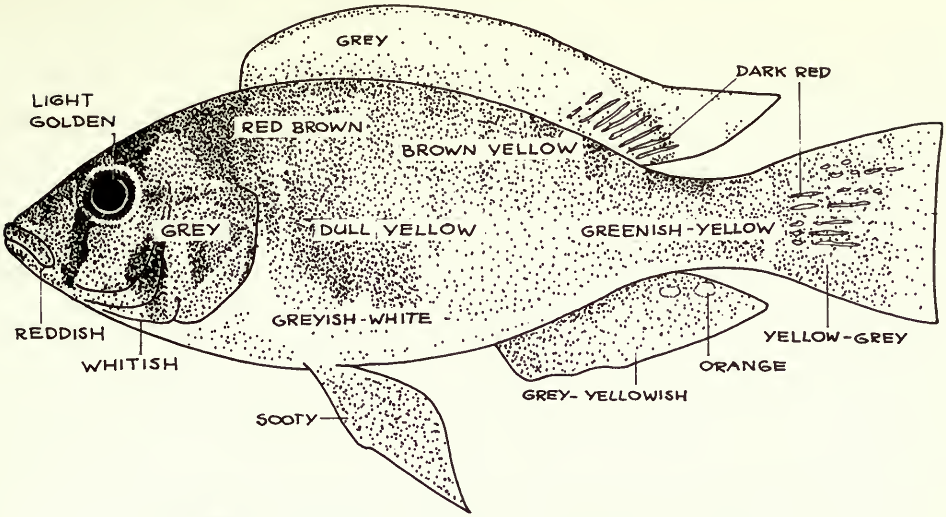
GREY
DARK RED
LIGHT GOLDEN
RED BROWN
BROWN YELLOW
GREY
DULL YELLOW
GREENISH-YELLOW
REDDISH
WHITISH
GREYISH-WHITE
YELLOW-GREY
ORANGE
GREY-YELLOWISH
SOOTY

Fig. 51 *Haplochromis lacrimosus.* Male, sexually quiescent.

yellow with a green sheen. Chest and ventral aspect greyish-white. Caudal peduncle greenish-yellow. *Fins.* Dorsal grey, with a red flush and dark red maculae on the soft part. Pectorals hyaline. Pelvics sooty over yellow. Anal grey-yellowish with two orange egg dummies. Caudal yellowish-grey with a red flush proximally, dark red dorsally.

Haplochromis parvidens (Boulenger), 1911

see Greenwood (1959 : 194)

Juvenile ♀, S.L. 99·0 mm (BM(NH) 1977.1.28:35). Fig. 52.

LOCALITY. Mwanza Gulf, depth 1 m, sand bottom.

MARKINGS. Faint opercular blotch and seven more or less distinct vertical bars on the flank.

COLORATION. *Head.* Ethmoid region and frontal part of dorsal head surface dark, remainder dark golden-yellow. *Eye.* Iris dark golden-yellow, inner ring orange. *Body.* Dorsum light golden-grey, flank grey-silver with a yellow overlay. Chest and belly greyish golden. Caudal peduncle dark golden-yellow. *Fins.* Dorsal and caudal dark yellow grey. Pectorals hyaline, pelvics and anal yellow, the latter hyaline in the area around the two small orange spots.

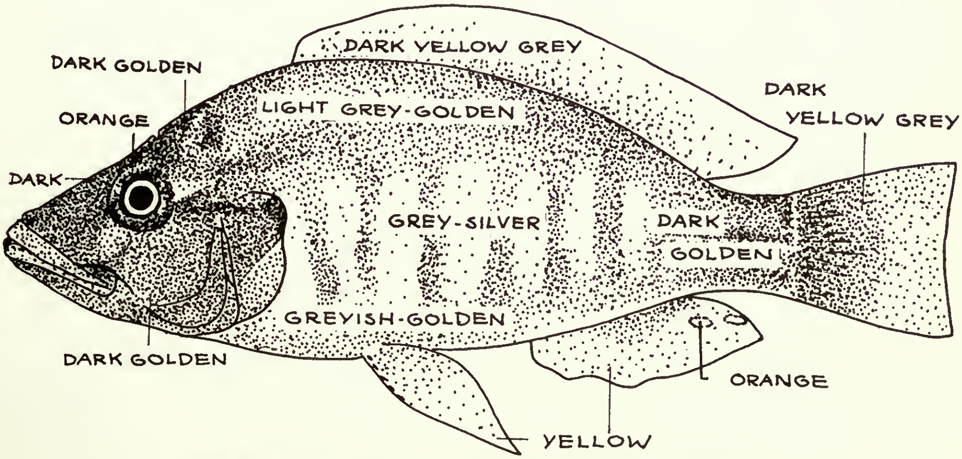
DARK YELLOW GREY
DARK GOLDEN
ORANGE
LIGHT GREY-GOLDEN
DARK YELLOW GREY
DARK
GREY-SILVER
DARK GOLDEN
GREYISH-GOLDEN
DARK GOLDEN
ORANGE
YELLOW

Fig. 52 *Haplochromis parvidens.* Female, immature.

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—— 1962. A revision of the Lake Victoria *Haplochromis* species (Pisces, Cichlidae), Part V. *Bull. Br. Mus. nat. Hist.* (Zool.) **9** : 139–214.

—— 1967. A revision of the Lake Victoria *Haplochromis* species (Pisces, Cichlidae), Part VI. *Bull. Br. Mus. nat. Hist.* (Zool.) **15** : 29–119.

—— 1974. The cichlid fishes of Lake Victoria, East Africa: the biology and evolution of a species flock. *Bull. Br. Mus. nat. Hist.* (Zool.) Suppl. 6 : 1–134.

—— **& Gee, J. M.** 1969. A revision of the Lake Victoria *Haplochromis* species (Pisces, Cichlidae), Part VII. *Bull. Br. Mus. nat. Hist.* (Zool.) **18** : 1–65.

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Miscellanea

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A. Fain

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Mites of the family Myobiidae (Acarina: Prostigmata) from mammals in the collection of the British Museum (Natural History)

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Institut de Médecine Tropicale Prince Leopold, Nationalestraat 155, B-2000 Antwerpen, Belgium

Contents

Introduction . . . 193
Descriptions of mites . . . 193
Family Myobiidae . . . 193
Subfamily Archemyobiinae . . . 194
Subfamily Myobiinae . . . 194
References . . . 228

Introduction

During 1972, 1973 and 1974, I had the opportunity to collect an interesting series of parasitic mites from various mammals in the collection of the British Museum (Natural History). Among this collection I found a number of new species belonging to several new genera of Myobiidae. The present paper provides detailed descriptions and figures of these species, preliminary diagnoses of all but one of which have been given in previous papers (Fain, 1972, 1973). In addition, three species found on bats preserved in the Institut royal des Sciences naturelles de Belgique, Bruxelles, and one species from a bat in the collection of the U.S. National Museum, Washington, are described.

Types have been deposited in the respective institutions where the mites were collected.

In the following descriptions the length of the body includes that of the gnathosoma but not of the palps.

Descriptions of mites

Family **MYOBIIDAE** Megnin, 1877

The family Myobiidae has been divided into two subfamilies on the basis of the structure of the clasping organs of legs I (Fain, 1973b, 1973c):

(1) Subfamily Archemyobiinae Fain, 1973 (see Fain, 1973b). The clasping apparatus consists of two processes situated on the internal surface of genu I forming a groove. The hair of the host is lodged in this groove and is grasped tightly when the two legs I are pressed together. The tarsus and the tibia I are well developed and normally articulated (Figs 4 & 5).

TYPE-GENUS. *Archemyobia* Jameson, 1955.

HOSTS. American marsupials.

(2) Subfamily Myobiinae Megnin, 1877. The clasping apparatus is formed of two striated processes situated on the external part of leg I, one on the genu, the other on the femur. The hair of the host is held between these two processes. There is no groove on the internal surface of leg I.

The Myobiinae are divided into two tribes:

(a) *Australomyobiini* Fain, 1973 (see Fain, 1973b). Legs I with tibia and tarsus articulated; tarsus well developed bearing two small but normally formed claws. Clasping processes of legs I sub-

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equal and triangular, much longer than wide, and in the shape of strong retrorse hooks (Figs 6 & 7).

TYPE-GENUS. *Australomyobia* Fain, 1973 (see Fain, 1973b).

HOSTS. Australian marsupials.

(b) *Myobiini* Megnin, 1877. Tibia and tarsus I either completely or incompletely fused but not clearly articulated. Claws I absent, very poorly developed or vestigial. Clasping processes of legs I very unequal and not in the shape of strong retrorse hooks (Figs 12 & 13, 23–26).

TYPE-GENUS. *Myobia* von Heyden, 1826.

HOSTS. Insectivora, Chiroptera, Rodentia.

The Australomyobiini form a link between the more primitive Archemyobiinae and the most evolved Myobiinae.

It is interesting to note that the myobiids that live on Australian marsupials are more highly evolved than those parasitizing the American marsupials. This fact is an argument in favour of the assumption that the Australian marsupials arose from the most primitive forms of the American marsupials.

Subfamily **ARCHEMYOBIINAE**

Genus ***ARCHEMYOBIA*** Jameson, 1955
Subgenus ***DROMICIMYOBIA*** Fain, 1973

The subgenus *Dromicimyobia* is known only from nymphal stages. It is distinguished from the typical subgenus by the presence of only one claw on legs II–IV, instead of the two claws present in *Archemyobia*.

TYPE-SPECIES. *Archemyobia* (*Dromicimyobia*) *dromiciops* Fain, 1973.

Archemyobia* (*Dromicimyobia*) *dromiciops Fain, 1973

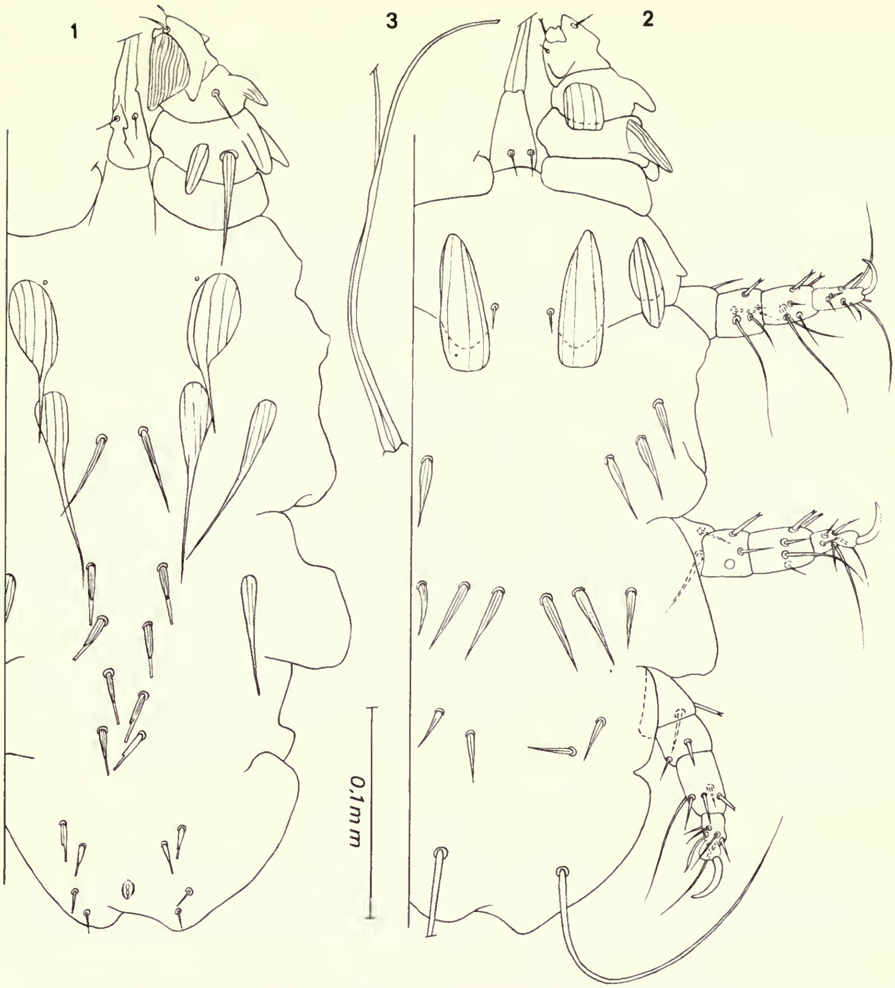
NYMPH (probably a tritonymph) (Figs 1–3). The holotype (Fain, 1973b) is 380 μm long and 180 μm wide. The *v e* setae are very wide and striated and they end in a very narrow prolongation. The *v i* are much narrower, striated and toothed and are situated a little behind the bases of the *sc i*. The *sc i*, *sc e* and *l 1* resemble the *v e* but they are narrower and have a longer posterior prolongation. The *d 1–d 5* and *l 2* are striated and toothed. The *l 3* and *l 4* are short and rodlike without visible tooth. *Venter*. Coxal I and II hairs very wide, truncate posteriorly and striate, the other coxals much narrower and not truncate. The *ic 1* very thin and short, *ic 2–ic 4* slightly lanceolate and striate. Coxal hairs (I–IV): 2–2–2–1. Legs I as in subgenus *Archemyobia*. Legs II–IV each with one curved claw. Chaetotaxy of legs (II–IV): trochanters 1–2–2; genua-femora 4–2–2; tibiae 6–5–5; tarsi 7–6–6.

MATERIAL EXAMINED. Holotype and five paratypes, all nymphs, from ♀ *Dromiciops australis* (Marsupialia), BM no. 1924.2.5.1, Valdivia, Chile. Holotype (no. 1974.250) and one paratype (no. 1974. 251) in BMNH.

Subfamily **MYOBIINAE**
Tribe **AUSTRALOMYOBIINI**

Genus ***AUSTRALOMYOBIA*** Fain, 1973

DEFINITION. Legs I with the three apical segments well developed and articulated. Genu I bears a long external triangular process directed posteriorly and striated on its dorsal surface. Femur I bears apparently a similar process on the external part of its ventral surface, but as this process is hammer-shaped it could be in fact a modified hair that is attached by a narrow and rounded base. Legs I–IV with two claws. These claws are small and equal on legs I and unequal on legs II–IV.



Figs 1–3 *Archemyobia* (*Dromicimyobia*) *dromiciops* Fain, holotype nymph. (1) dorsal view; (2) ventral view; (3) chelicerae.

Vulvar lobes very poorly developed. Genital hairs *g 7* long, relatively strong and curved. Gnathosoma well developed.

Chaetotaxy. All the hairs are toothless; *v i* thin and short; *v e, sc i, sc e, dl–d 4, l 1–l 3* thick and more or less distinctly striate; *d 5* and *l 4–l 5* thin. The *l 5* is similar to the *l 4* setae or smaller than the latter. The *ic 1–ic 4* are thin and bare. Coxal hairs (I–IV): 2–3–1–1, all these hairs are relatively long. Legs (I–IV): trochanters 3–3–3–3; femora 6 (or 7)–5–3–3; genua 7–7–7–7; tibiae 5–6–6–6; tarsi 8–7–6–6.

TYPE-SPECIES. *Australomyobia dasycercus* Fain, 1973.

HOSTS. Australian marsupials.

Australomyobia dasycercus Fain, 1973

A. dasycercus (see Fain, 1973b) is distinguished from *A. necopina* (Domrow, 1973) (= *Archemyobia necopina* Domrow, 1973) (Figs 10 & 11) by the following characters:

(1) Most of the dorsal hairs are much thicker and striated longitudinally. The *sc i* are shorter but the *l 1* are longer. The *sc i* are inflated in their basal half and 15 μm thick (in *A. necopina*

these hairs are cylindro-conical and 4–5 μm thick in their basal half). The *d 5* are more external. The *l 5* are as long as the *l 4*. The *d 1*, *d 2* and *l 3* have no ventral expansion. The *g 1* are more anterior. The anterior hairs of tibiae and genua III–IV are furcate.

(2) Claws II–IV much more unequal. The small claws are approximately 10, 8 and 8 μm long respectively (in *A. necopina* the small claws are 13, 14 and 14 μm long respectively).

(3) Legs I shorter (100 μm from base of trochanter, to tip of tarsus) and thicker (maximum width of the femur: 48 μm). In *A. necopina* 113 μm × 36 μm.

FEMALE (holotype) (Figs 6–9). Length 480 μm, maximum width 270 μm. With the characters of the genus. In the holotype and only known specimen the *d 3*, *d 4* and *l 2* are broken at their bases.

MATERIAL EXAMINED. Holotype ♀ from *Dasycercus cristicauda* (Marsupialia), BM no. 97.1.3.2, Charlotta Waters, Central Australia. Holotype (no. 1974.257) in BMNH.

Tribe **MYOBIINI**

Genus ***MYSTACOBIA*** Fain, 1972

DEFINITION. Only the female and a nymph are known (Fain, 1972a). Ventral surface of female with coxal shields becoming free laterally. Leg I with a free, small and rounded tarsus, inserted on tibia in dorso-terminal situation. Tibia I entirely striated ventrally such as in some myobiid genera from Insectivora. The femoral process of the clasping organ of leg I is very broad. Claws on legs I–IV: 0–2–2–2. The claws on legs II–IV are long and subequal. Vulva with 2 large lobes. The *g 7* setae are strong and curved. The *v i* and *v e* setae are thick and striated.

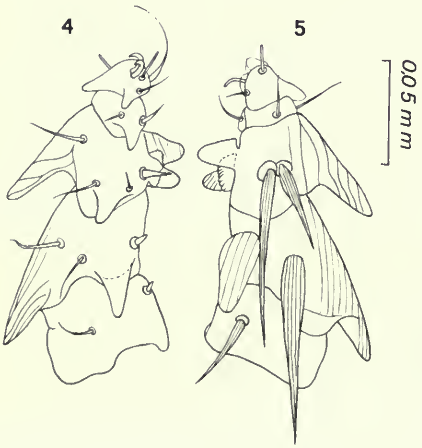
Chaetotaxy. Coxal hairs (I–IV) 2–3–0–0. Legs (II–IV): trochanters 3–3–3; femora 5–3–3; genua 7–6–6; tibiae 6–6–6; tarsi 7–6–6. There is one solenidion on tarsus II and one (very short) on genu II.

TYPE-SPECIES. *Mystacobia hirsuta* Fain, 1972.

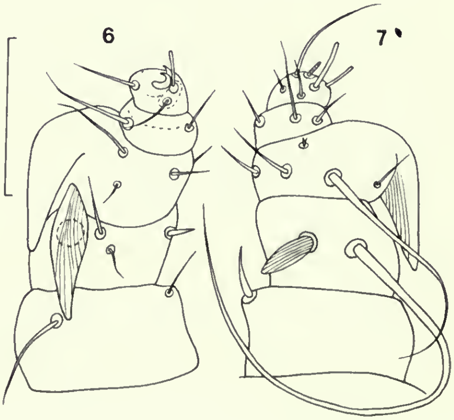
Mystacobia hirsuta Fain, 1972

M. hirsuta (see Fain, 1972a) is known from the holotype female and a nymph.

FEMALE (holotype) (Figs 12–16). Length of the body 729 μm; maximum width 310 μm. *Dorsum* transversely striated except the opisthosoma which is covered by a large punctate shield wider



Figs 4 & 5 *Archemyobia* (*Archemyobia*) *brasiliensis* Fain, female. (4) ventral view; (5) dorsal view.



Figs 6 & 7 *Australomyobia dasycercus* Fain, holotype female, leg I. (6) ventral view; (7) dorsal view.

8

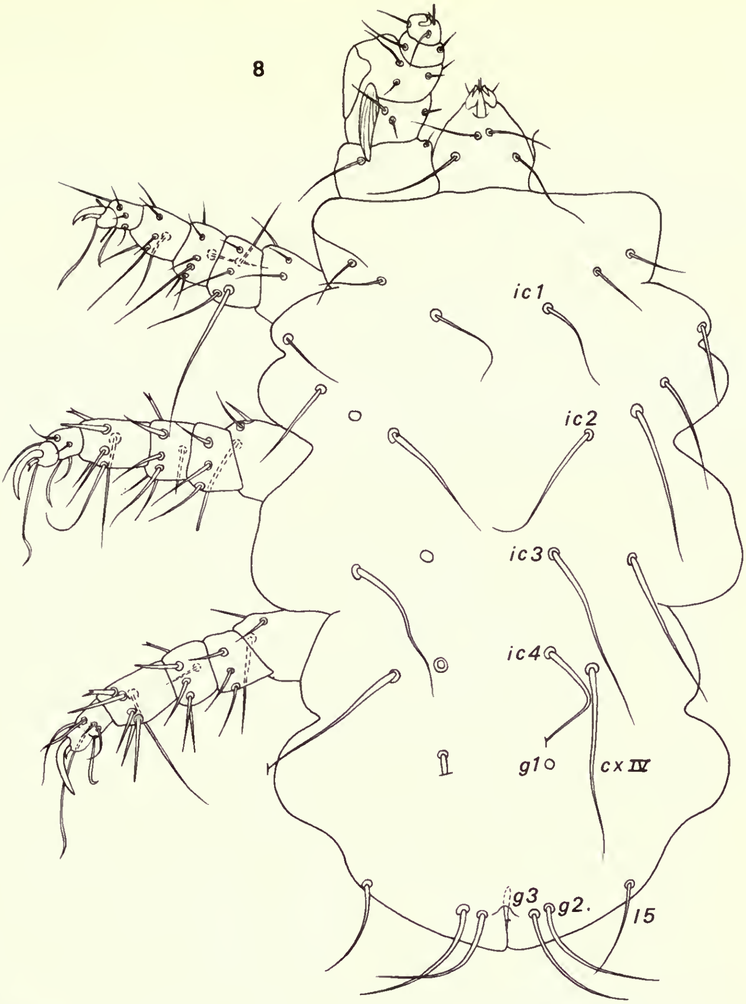


Fig. 8 *Australomyobia dasycercus* Fain, holotype female, ventral view.

than long. Vulva with well-developed lobes. The *v i*, *v e*, *sc i*, *sc e*, *d 1*, *d 2* and *l 1* hairs wide and strong, with a double oblique striation, and not toothed. They are strongly attenuated posteriorly. The *v i* are much smaller than the *v e*. The *d 3*, *d 4*, *d 5*, *l 2*, *l 3* and *l 4* are thin and much shorter (maximum 45 μm long). *Venter*. All the coxae are covered by sclerotized plates which become free laterally. The cuticle is striated in a short transverse band between coxae III and IV, in the lateral region of opisthosoma and in a narrow median band of the propodosoma. The *ic 1* hairs are short, the *ic 2* and *ic 3* are stronger and 120 and 250 μm long respectively. The *ic 4* are thin and 130 μm long. Gnathosoma wider than long. Palps very short. Legs I: Tarsus very small, situated in the dorso-apical region of the tibia. The latter is wider, long and completely striated on its ventral surface. This striation structure of the tibia is also encountered in some genera of Myobiidae living on Insectivora. The clasping organ is situated ventrally. It is formed by two striated processes, one being situated on the genu, directed forwards and inwards, the other, very large, is situated on the femur and is directed posteriorly.

NYMPH. Length 310 μm, width 195 μm. The *v i* hairs are absent. The *v e* are very wide and with a simple longitudinal striation. The *sc i*, *sc e*, *l 1*, *d 1*, *d 2* are striated. The *d 1*–*d 4* and *l 1*, *l 2* are toothed. The *l 3* and *d 5* are lacking. The *ic 1* is narrow and short, the *ic 2*, *ic 3* and the inner coxal II is in short oval and striated. The *ic 4* is thin and long. The inner coxal I is rectangular, long and very wide and striate. Legs I symmetrical. Legs II with two claws; legs III–IV with one long curved claw.

Material examined. Holotype ♀ and paratype nymph from *Mystacina tuberculata* (Chiroptera), BM no. 62.2116–2117, Solomon Is., north of Long Is., Stewart Is., New Zealand, collected in 1932 (E. F. Stead). Holotype (no. 1974.256) in BMNH. [Note: In the original description (Fain, 1972a), the bat host was referred to as *Mystacops velutinus* and the type-locality was incorrectly stated to be Stewart Is., Solomon Is.]

Genus *PTEROPIMYOBIA* Fain, 1973

Definition. Tibia and tarsus I fused (Fain, 1973b), forming a voluminous complex bearing several small chitinous triangular tooth-like processes directed posteriorly. Genu I very large. The clasping organ of leg I is formed of two rather small striated processes, the process of the genu being bifid. Legs I–IV with 0–2–2–2 claws, these claws are well-developed, subequal and only

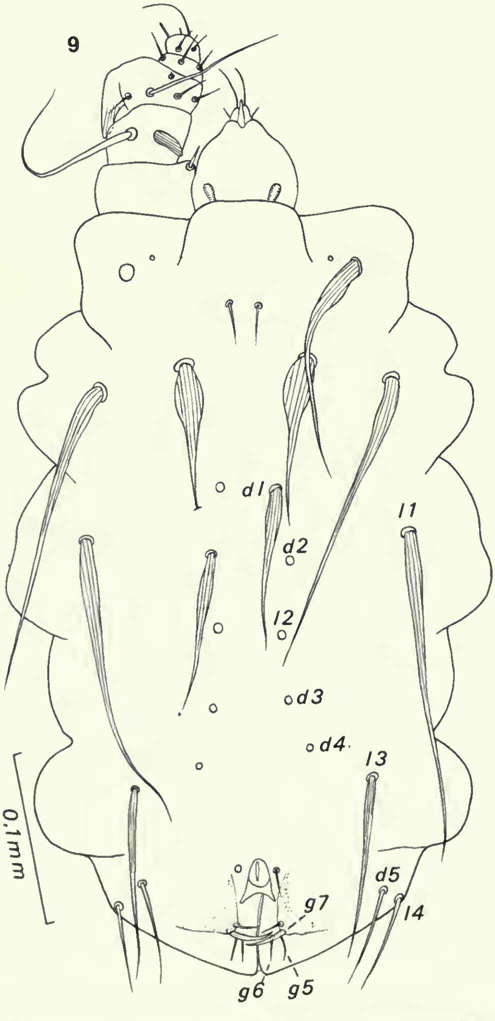
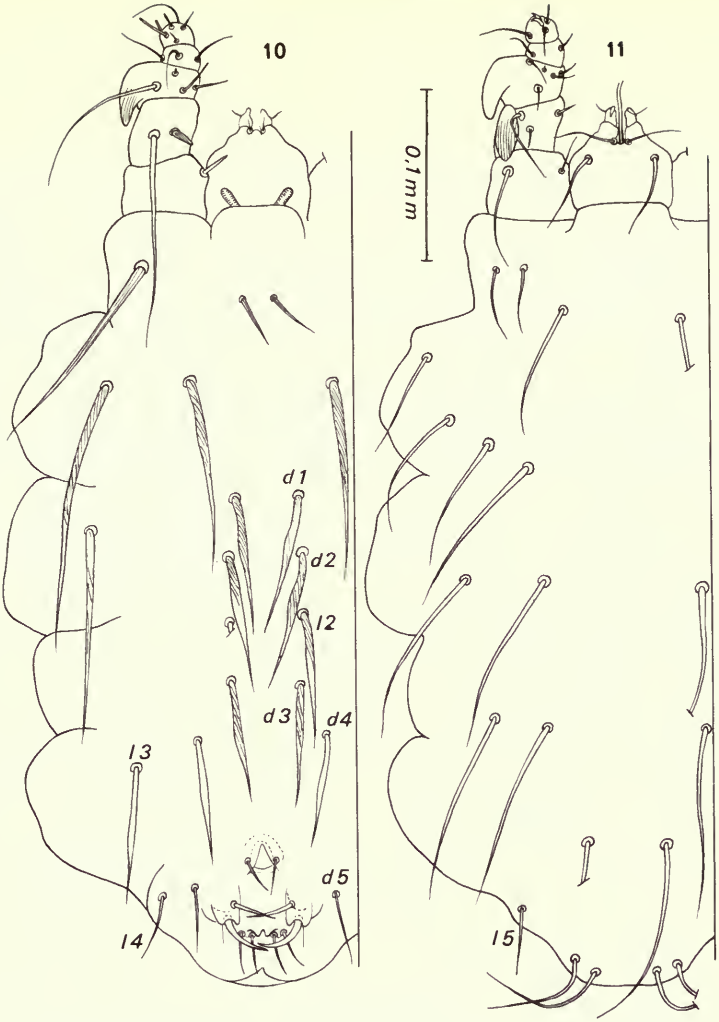
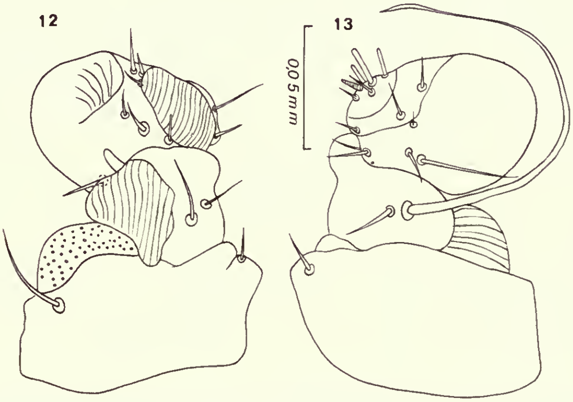


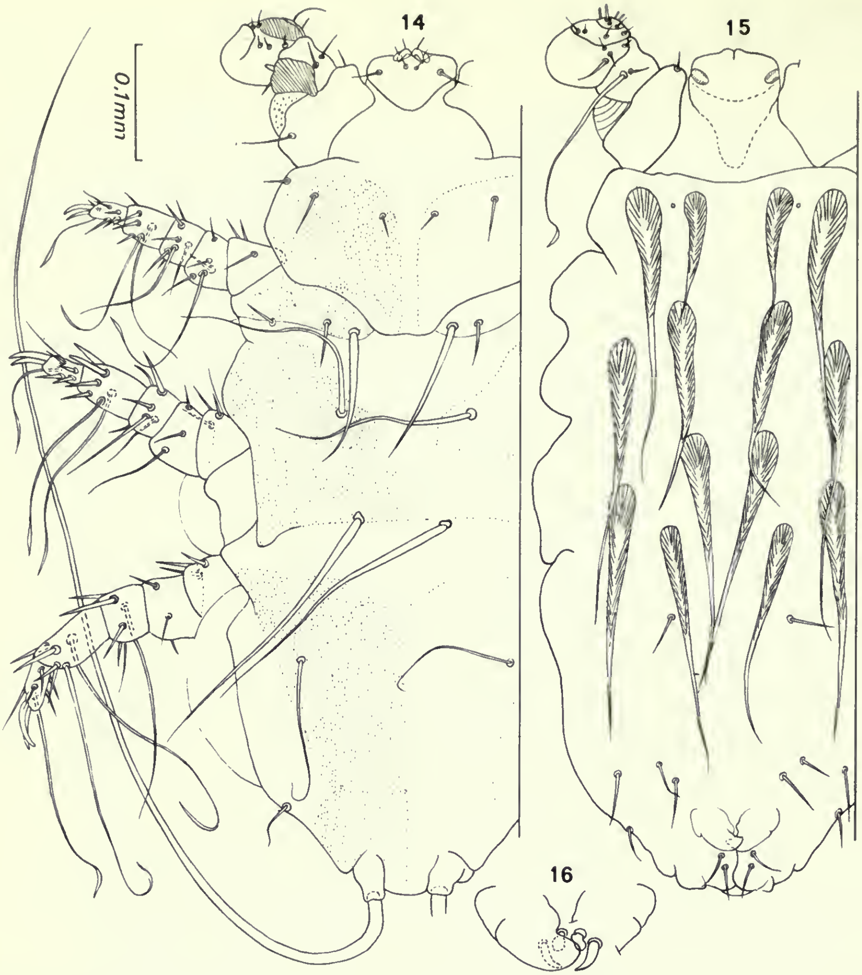
Fig. 9 *Australomyobia dasycercus* Fain, holotype female, dorsal view.


10
11
0,1mm
d1
d2
12
d3
d4
13
d5
14
15

Figs 10 & 11 *Australomyobia necopina* (Domrow), female. (10) dorsal view; (11) ventral view.



Figs 12 & 13 *Mystacobia hirsuta* Fain, holotype female, leg 1. (12) ventral view; (13) dorsal view.



Figs 14–16 *Mystacobia hirsuta* Fain, holotype female. (14) ventral view; (15) dorsal view; (16) vulvo-anal region.

slightly curved. The *v i* setae are very small. The *ic 1* and the internal *cx I* setae are broad and striated, shell-shaped. Vulvar lobes present, variably developed.

Chaetotaxy. d 1–d 5 and *l 1–l 5* present; coxae (I–IV) 2-3-0-1. Legs (II–IV): trochanters 3-3-3; femora 5-3-3; genua 7-6-6; tibiae 6-6-6; tarsi 7-6-6. There is one solenidion on tarsus II and one very small bifid solenidion on genu II.

TYPE-SPECIES. *Pteriopimyobia nyctineme* Fain, 1973.

Pteropimyobia nyctimene Fain, 1973

The original specific name *nyctineme* was misspelt (Fain, 1973b) since the generic name of the host was *Nyctimene* and *not Nyctineme*. I have therefore emended the name of this species to *Pteropimyobia nyctimene* (see Fain, 1974).

FEMALE (Figs 17–19). The holotype is 546 µm long and 220 µm wide. Dorsal hairs broad and with longitudinal striations except the genitals and the *l 4* which are narrow and bare. All these hairs are toothless. Vulvar lobes rounded, rather well developed but presenting many folds caused probably by maceration. *Venter*. The *ic 1* and the 2 coxal II setae are flat, wide and striated;

ic 2–ic 4 are strong and striated. Gnathosoma trapezoidal, very small, and bearing ventrally a pair of shell-shaped hairs resembling the *ic 1* hairs; palps inserted ventrally. Legs I voluminous, the tibio-tarsus bears 3 teeth, of which 2 are situated in the apical half of the ventral surface and one on the dorsal surface near the apex.

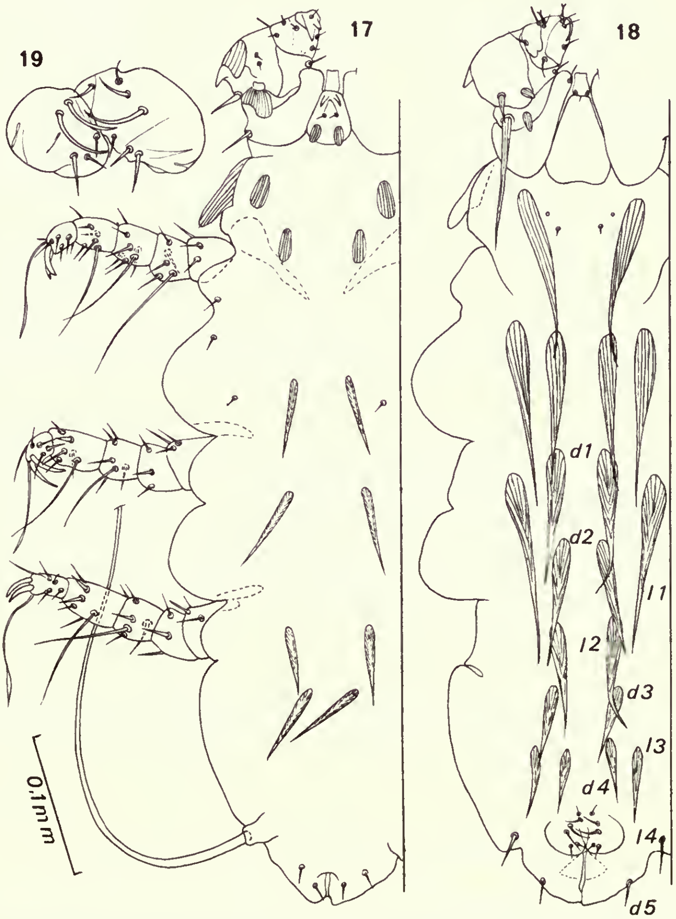
MALE (allotype). Length 408 μm, width 174 μm. Genital orifice situated at the level of the *sc e*, the genital area with 2 pairs of very small hairs. Penis sinuous, 180 μm long. Setae *v i* and *v e* as in the female. The *sc i* are very small; *d 1*, d *2* and *l 1* thick and striated. Ventral hairs and legs as in the female.

MATERIAL EXAMINED. Holotype ♀, 2 paratype ♀♀ and allotype ♂ from *Nyctimene bougainvillei* (Chiroptera), no. 6343 in Institut royal des Sciences naturelles de Belgique, Buin, Bougainville Is., Solomon Is., collected 1947. Types in the Institut royal des Sciences naturelles de Belgique, Bruxelles.

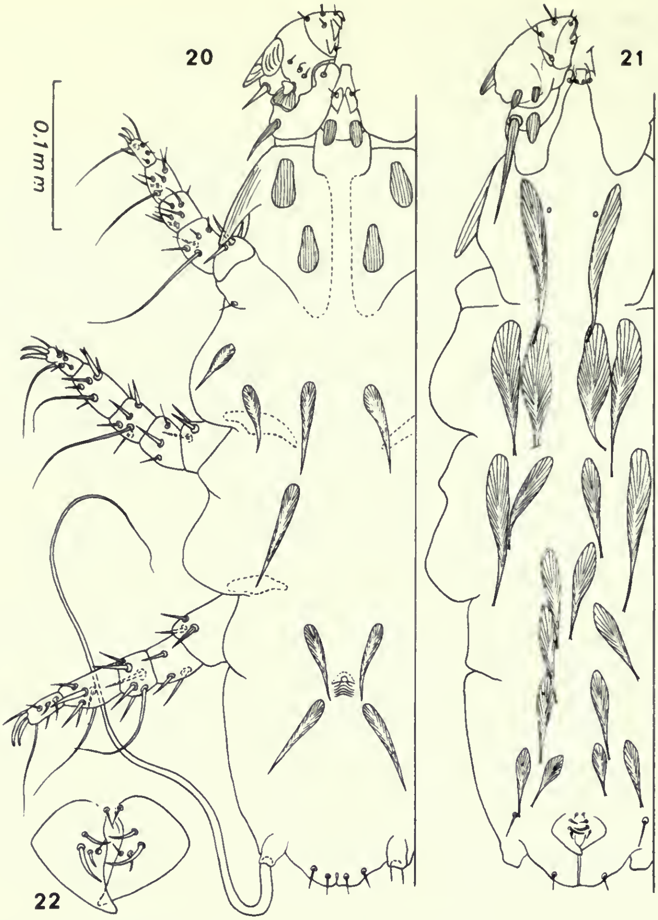
Pteropimyobia pahangensis Fain, 1973

P. pahangensis (see Fain, 1973b) is distinguished from *P. nyctimene* Fain by the following characters:

(1) Tibio-tarsus I with 5 triangular teeth, of which 4 are ventral and situated on a longitudinal row and one is apical dorsal.



Figs 17–19 *Pteropimyobia nyctimene* Fain, holotype female. 17 ventral view; (18) dorsal view; (19) vulvo-anal view.



Figs 20–22 *Pteropimyobia pahangensis* Fain, holotype female. (20) ventral view; (21) dorsal view; (22) vulvo-anal region.

(2) The *sc i* and *sc e* hairs are shorter and much wider and bear a double and oblique striation. The two internal pairs of *cx II* hairs are wide and striate.

(3) Presence of a copulatory orifice situated medially, between *ic 4* and *cx IV*.

FEMALE (Figs 20–24). The holotype is 525 µm long and 190 µm wide. The *sc i*, *sc e*, *d 1–d 4*, *l 1–l 3* are wide and with a double oblique striation. Vulvar lobes well developed. Ventral hairs as in *P. nyctimene* but distinctly wider.

MALE. Unknown.

MATERIAL EXAMINED. Holotype ♀ and 2 paratype ♀♀ from the neck of *Macroglossus minimus sobrinus* (Chiroptera), BM no. 67.1490, Gunong Benom, Pahang, Malaya, collected 18.iii.1967. Holotype (no. 1974.259) in BMNH.

Genus ***PHYLLOSTOMYOBIA*** Fain, 1973

DEFINITION. Only the female is known (see Fain, 1973b). Legs I with the tibia and tarsus fused forming a small complex devoid of apical claws. Genu I large, strongly oblique with a ventral clasping process recurved ventrally and inwards. Trochanter I very broad, with the anterior extremity strongly expanded. Legs II–IV narrow, ending in two subequal or unequal and slightly curved claws. Vulvar lobes conical, well developed. Gnathosoma normally developed, with a pair of ventral flat and retrorse processes.

Chaetotaxy. v i and *sc i* very thin and short, the *sc i* may be absent. The *d 1*, *d 2* and *l 1* are strong, all these hairs are toothed. Other dorsal hairs variable. The *l 4* is lacking. Ventral hairs, except *l 5*, very thin and short (maximum 20 μm long). Coxal hairs (I–IV): 2–3–0–1. *Legs* (II–IV): trochanters 3–2–2; femora 5–2–2; genua 5–4–4; tibiae 6–6–6; tarsi 6–6–6. Tarsus II with a short cylindrical dorso-apical solenidion; there is also a very short and bifurcate solenidion on genu II.

TRITONYMPH. Legs I very unequal in shape. Legs II–IV with 2–1–1 claws.

TYPE-SPECIES. *Phyllostomyobia mimon* Fain, 1973.

Key to species of *PHYLLOSTOMYOBIA*

Females

1 Claws of leg III–IV unequal and larger: long claw 25 μm, short claw 19 μm long. The *sc i* are lacking; the *l 2* are shorter and much thinner than the *d 1* and *d 2*; the *v e* and *sc e* are inflated basally and abruptly narrowed behind the tooth; *ic 4* and *cx IV* are subequal and very short . . . . **P. leptonycteris** Fain, 1973

– Claws of legs III–IV equal or subequal and shorter (length 10–12 μm). The *sc i* are present, *l 2* not shorter or thinner than *d 1* and *d 2*; *v e* and *sc e* not inflated basally and not abruptly narrowed behind the tooth 2

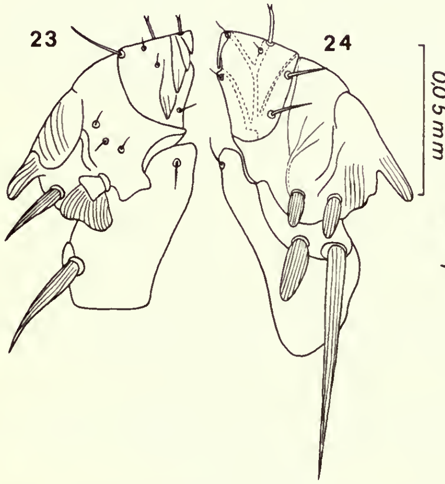
2 The *d 3* and *d 4* are thicker, longer (20–25 μm) and rod-like; *l 2* situated at 30 μm behind the *d 2*; *sc e* and *l 1* shorter (63–65 μm); *v e* longer (42 μm); *d 1*, *d 2* and *l 2* slightly inflated basally; *sc i* situated at 12–15 μm from the *sc e* . . . . **P. chrotopterus** Fain, 1973

– The *d 3* and *d 4* are very short (8–9 μm) and very thin; *l 2* situated at 50–57 μm from the *d 2*; *sc e* and *l 1* longer (80–90 μm); *v e* slightly shorter (33–36 μm); *d 1*, *d 2* and *l 2* not distinctly inflated basally; *sc i* situated at 27–30 μm behind the *sc e* . . **P. mimon** Fain, 1973

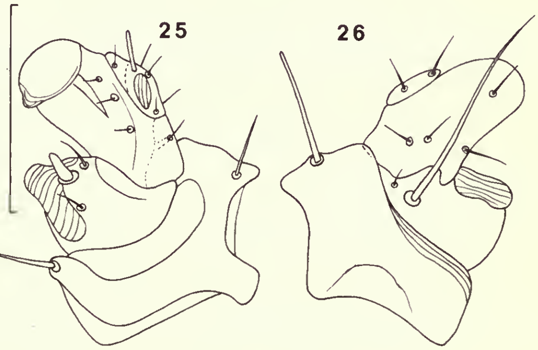
Phyllostomyobia mimon Fain, 1973

Only the female is known (Fain, 1973b).

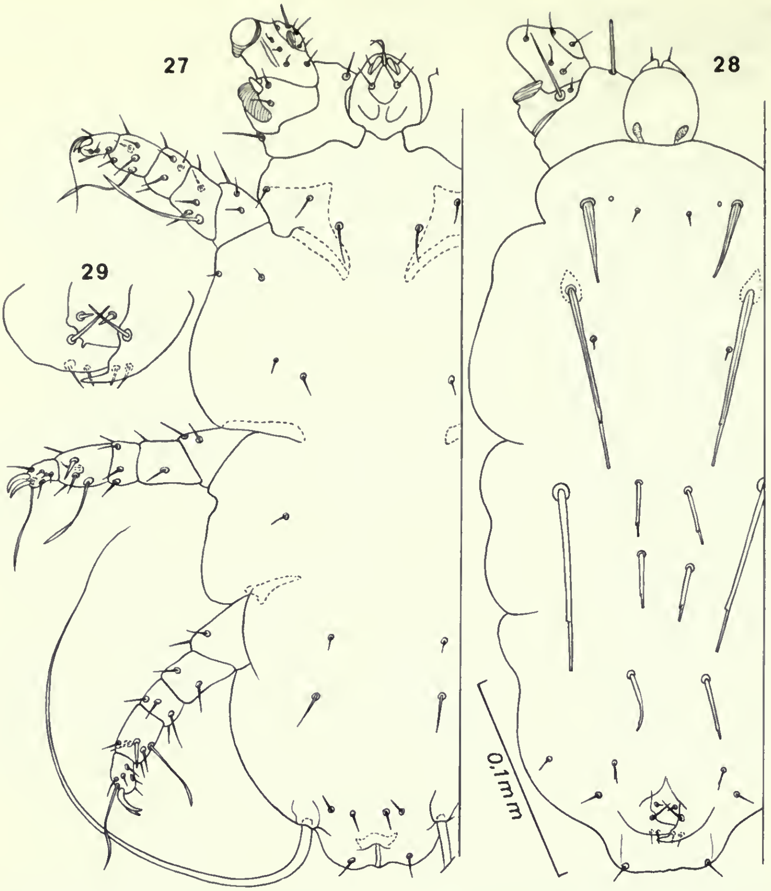
FEMALE (Figs 25–29). The holotype is 375 μm long and 171 μm wide. With the characters given above in the description of the genus and the key.



Figs 23 & 24 *Pteropimyobia pahangensis* Fain, female, leg I. (23) ventral view; (24) dorsal view.



Figs 25 & 26 *Phyllostomyobia mimon* Fain, holotype female, leg I. (25) ventral view; (26) dorsal view.



Figs 27–29 *Phyllostomyobia mimon* Fain, holotype female. (27) ventral view; (28) dorsal view; (29) vulvo-anal region.

Material examined. Holotype ♀ and paratype ♀ from *Mimon bennetti* (Chiroptera), BM no. 65.618, forest reserve 24 miles along Potaro road from Bartica, Guyana. Holotype (no. 1974.260) in BMNH.

Phyllostomyobia chrotopterus Fain, 1973

P. chrotopterus (see Fain, 1973b) is known from three tritonymphs, two of which contain a completely developed female.

Female (in the tritonymph) (Figs 30 & 31). Length of the holotype female 320 μm, width 180 μm. With characters given above.

Tritonymph (containing a female). The posterior region of the dorsum bears 3 pairs of cylindro-conical and toothed hairs, 12–21 μm long. The two pairs of coxal I hairs are shell-shaped (nearly as wide as long and striate).

Material examined. Holotype ♀ (in tritonymphal skin), paratype ♀ (in tritonymphal skin) and paratype tritonymph from *Chrotopterus* sp. (Chiroptera), BM no. 13.7.8.10–11, Joinville, Sta Catharina, Brazil. Holotype and paratype tritonymph (no. 1974.258) in BMNH.

Phyllostomyobia leptonycteris Fain, 1973

P. lectonycteris (see Fain, 1973b) is known after the holotype female and several nymphs and larvae.

Female (holotype) (Figs 32–34). Length 380 μm long and 228 μm wide. With the characters of the genus. The *sc i* hairs are lacking. The *v e*, *sc e*, *l 1*, *d 1*, *d 2* are thick near their base and finely attenuated apically; the *l 2* hairs very thin and shorter than the *d 1* and *d 2*. The *d 3*, *d 4* and *l 3* are thin and short. Claws of legs II–IV unequal and longer than in the other species of the genus. Genital lobes well developed.

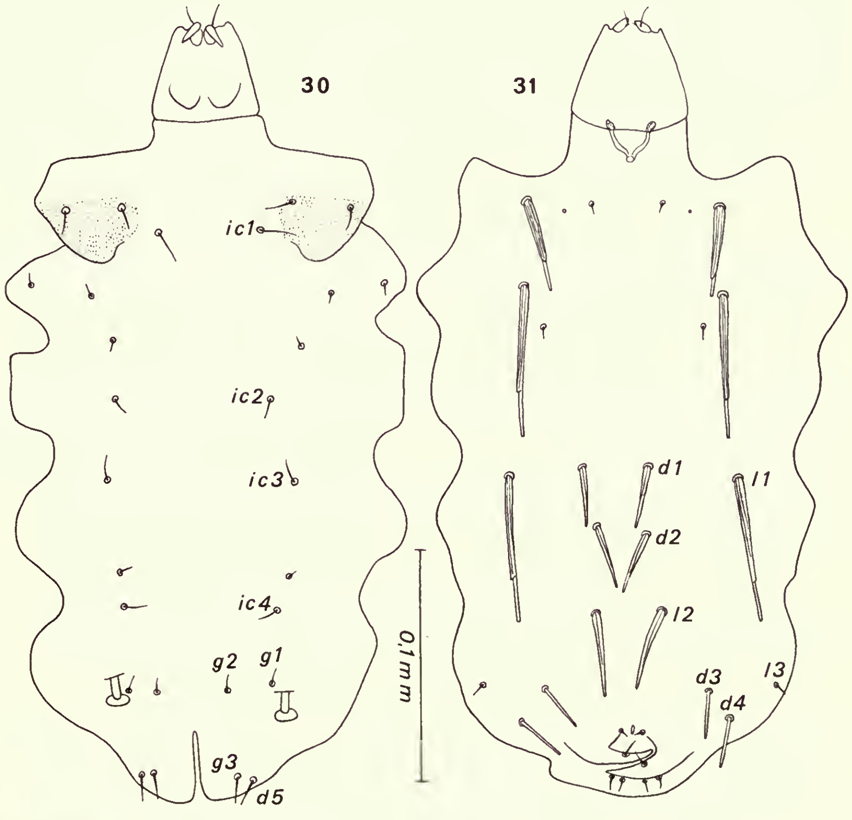
Material examined. Holotype ♀ and 2 paratype nymphs from facial hairs of *Leptonycteris nivalis* (Chiroptera), BM no. 40.813–815, Mt Emory, Texas, U.S.A. Holotype (no. 1974.261) in BMNH.

Genus *PTERACARUS* Jameson & Chow, 1952

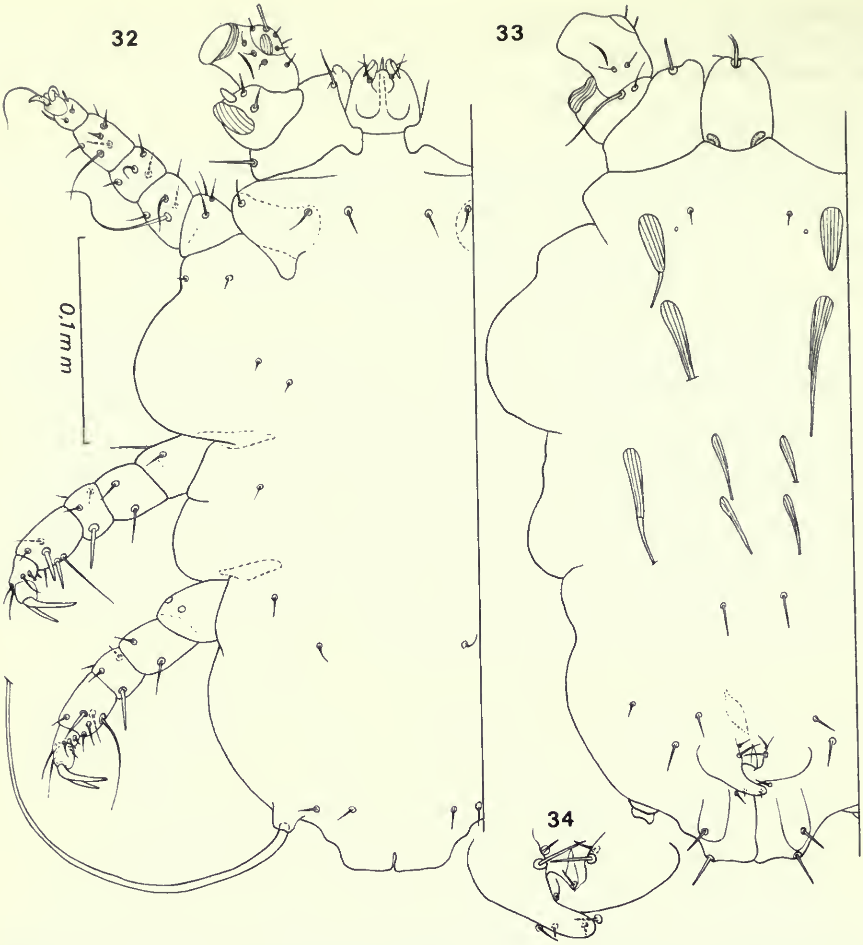
Pteracarus shealsi Fain, 1973

Dusbabek (1973) has revised the genus *Pteracarus*. *P. shealsi* (see Fain, 1973d) belongs to the group with 6 hairs on genu IV and 5 pairs of *d* hairs on the hysterosoma, the *d 1–d 3* being very small. It is distinguished from all other species of this group by the presence of only 2 hairs on trochanters II and by the length of the *ic 1* hairs which are distinctly longer than the *cx I* hairs.

Female (holotype and only specimen known) (Figs 35 & 36). Length 363 μm, maximum width 215 μm. *Dorsum*. The *v e*, *sc e* and *l 1* hairs are 99 μm, 170 μm and 150 μm long respectively. The *v i* and *sc i* are 12 μm long. The *l 3* and *l 4* are subequal and 23–24 μm long. *Venter*. The *ic 1* are much longer (30–35 μm) than the coxals I (12–18 μm). The external coxal II is only moderately inflated. The *g 1* are longer (24 μm) and stronger than the *ic 4* (16 μm). Gnathosoma 40 μm long and 46 μm wide with lateral margins nearly parallel.



Figs 30 & 31 *Phyllostomyobia chrotopterus* Fain, holotype female. (30) ventral view; (31) dorsal view.



Figs 32–34 *Phyllostomyobia leptonycteris* Fain, holotype female. (32) ventral view; (33) dorsal view; (34) vulvo-anal region.

Chaetotaxy of the legs (II–IV). Trochanters 2–3–3; femora 5–3–3; genua 7–6–6; tibiae; tarsi 6–6–6. Tibiae III–IV bear ventrally a short and strong striated spine. The anterior setae of trochanters II–III are distinctly barbed.

Material examined. Holotype ♀ from the posterolateral region of the dorsum of *Dasypterus ega* (Chiroptera), BM no. 34.7.3.1, Trinidad. Holotype (no. 1974.254) in BMNH.

Pteracarus macfarlanei Fain, 1973

P. macfarlanei (see Fain, 1973d) belongs to the same group as *P. shealsi* but the *d 1*, *d 2* and *d 3* setae are represented only by their bases. Genu IV bears 6 setae, the strong dorsal seta being present.

Female (Figs 37 and 38). The holotype is 312 µm long and 195 µm wide. *Dorsum*. The *v e*, *sc e* and *l 1* hairs are 63 µm, 108 µm and 96 µm respectively. The *v i*, *sc i*, *l 3* and *l 4* are 7·5 µm, 3 µm, 12 µm and 14 µm long respectively. The *d 4* and *d 5* are very thin and very short (4–6 µm). *Venter*. All the ventral setae are short or very short. The *ic 4* and *cx IV* are 9 µm and 8 µm long respectively, the *g 1* measure 12 µm. Gnathosoma distinctly wider (46 µm) than long (36 µm), with lateral margins rounded.

Chaetotaxy of the legs (II–IV). Trochanters 3–3–3. Other segments as in *P. shealsi.* The anterior setae of trochanters II–IV are not barbed. The ventral spine of tibiae III–IV is distinctly narrower than in *P. shealsi.*

MALE (Fig. 39). The allotype is 237 μm long and 156 μm wide. *Dorsum.* The lengths of the *v e*, *sc e* and *l 1* are 51 μm, 93 μm and 80 μm respectively. The *sc i* are situated at the same level as the *sc e*. The *d* setae are completely absent. The *l 4* is 5 μm long. Genital orifice situated on a punctate plate which bears 2 posterior pairs of unequal rodlike setae (11 μm and 7·5 μm) and 6 (or ? 7) pairs of very small, indistinct setae. Penis 145 μm long, slightly curved and very finely attenuated apically. *Venter.* All the setae very short and fine, maximum length 15–16 μm. Other characters as in the female.

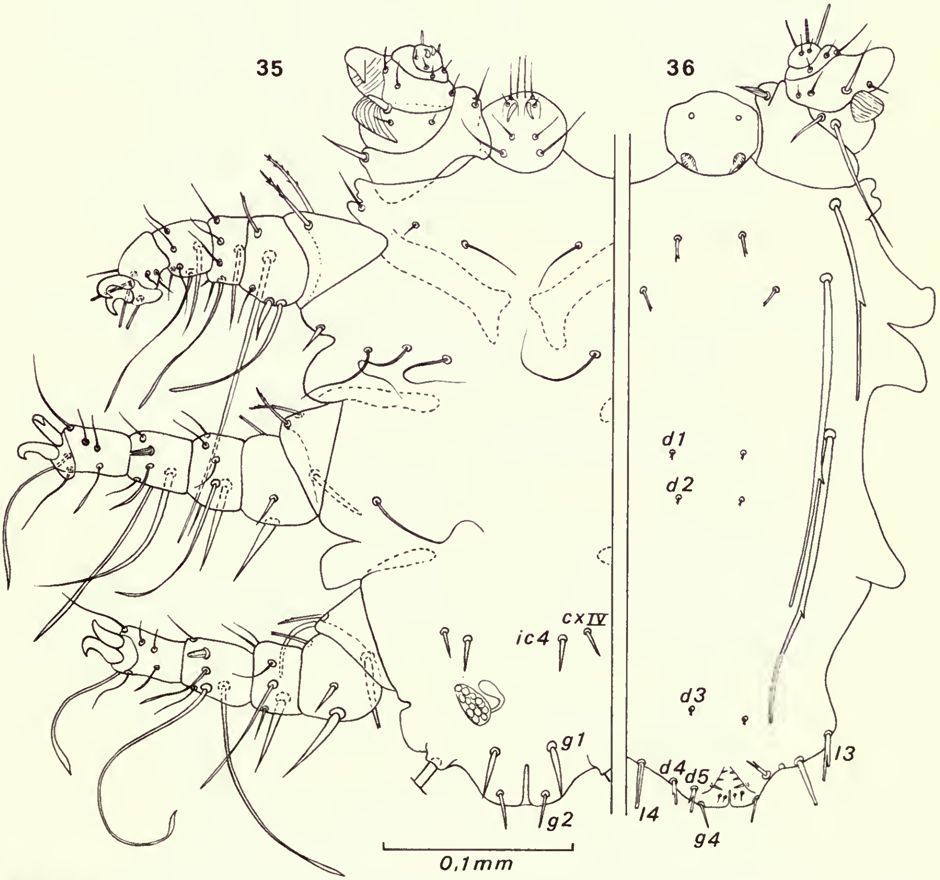
MATERIAL EXAMINED. Holotype ♀, allotype ♂, paratype ♀ and paratype ♂ from posterior part of the dorsum of *Murina huttoni* (Chiroptera), BM no. 67.1606, Gunong Benom, Pahang, Malaya, collected 17.iii.1907. Holotype (no. 1974.252) and allotype (no. 1974.253) in BMNH.

Pteracarus peruvianus sp. nov.

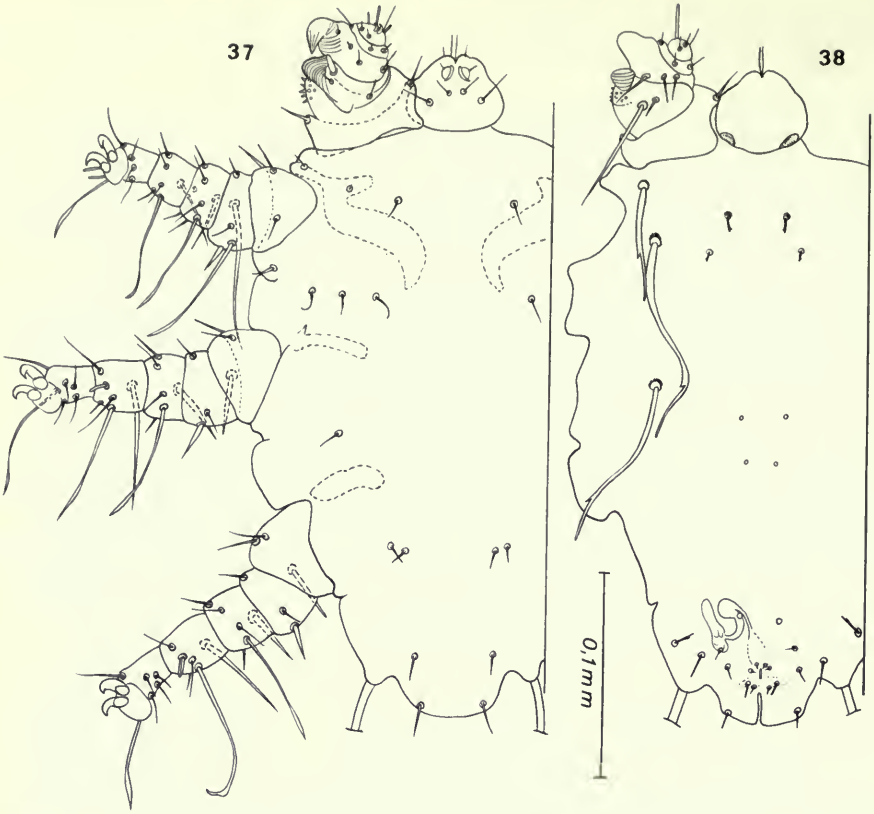
This new species is known from only one female specimen. It belongs to the group characterized by the presence of only 5 setae on genu IV (the dorsal being absent) and the absence of *d 1*, *d 2* and *d 3* setae.

It is distinguished from the other four species of that group by the combination of the following characters:

(1) The two pairs of ventral gnathosomal hairs are arranged in a transverse row.



Figs 35 & 36 *Pteracarus shealsi* Fain, holotype female. (35) ventral view; (36) dorsal view.



Figs 37 & 38 *Pteracarus macfarlanei* Fain, holotype female. (37) ventral view; (38) dorsal view.

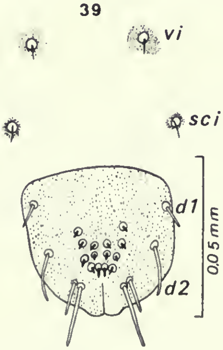
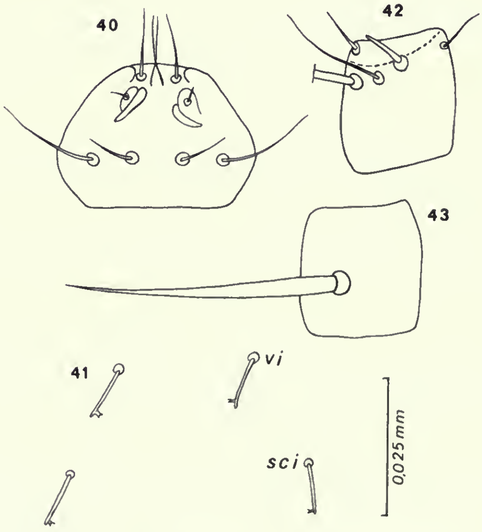
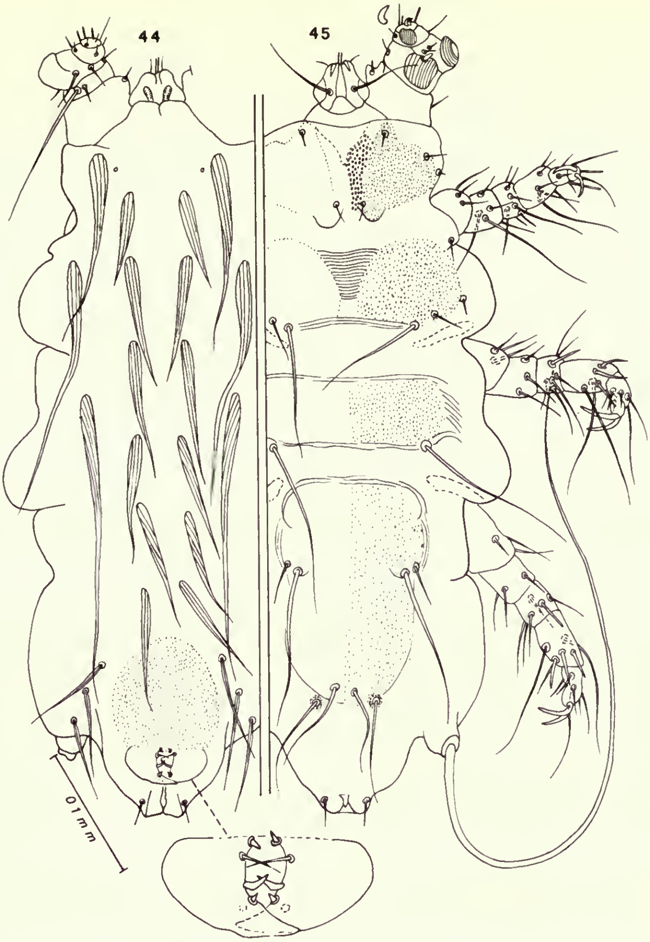

39
vi
sci
d1
d2
0,05 mm

Fig. 39 *Pteracarus macfarlanei* Fain, allotype male, genital region with *v i* and *sc i* hairs.


40
42
43
41
vi
sci
0,025 mm

Figs 40–43 *Pteracarus peruvianus* sp. n., holotype female. (40) gnathosoma, ventral view; (41) *v i* and *sc i* hairs; (42) tibia IV, ventral view; (43) tibia IV, dorsal view.



Figs 44 & 45 *Acanthophthirius* (*Myotimyobia*) *dasypterus* Fain, holotype female. (44) dorsal view; (45) ventral view.

(2) The ventral spine of tibia IV is narrow.

(3) The strong dorsal hair of tibia IV is long, and regularly cylindro-conical without a basal dilation.

(4) The epimera II–IV are strongly sclerotized.

(5) The *v i* and *sc i* setae have a small bifid preapical tooth.

FEMALE (holotype) (Figs 40–43). Length 294 μm, width 215 μm. Length of *v e*, *sc i* and *sc e* setae: 70 μm, 120 μm and 120 μm. The *v i* and *sc i* are 11–12 μm long. The *l 3* are stronger and longer (26 μm) than the *l 4* (length 20 μm). The *d 4* and *d 5* are very short (7·5 and 10 μm respectively). The *ic 4* and *g 1* are equal and they are slightly longer (14 μm) than the *cx IV* (11 μm). Gnathosoma wider (42 μm) than long (30 μm).

MATERIAL EXAMINED. Holotype ♀ from *Thyroptera discifera* (Chiroptera), BM no. 28.5.2.264, Cumeria, Loreto, High Ucayali, Peru. Holotype (no. 1974.255) in BMNH.

Genus *ACANTHOPHTHIRIUS* Perkins, 1925
Subgenus *MYOTIMYOBIA* Fain, 1972

Acanthophthirius* (*Myotimyobia*) *dasypterus Fain, 1973

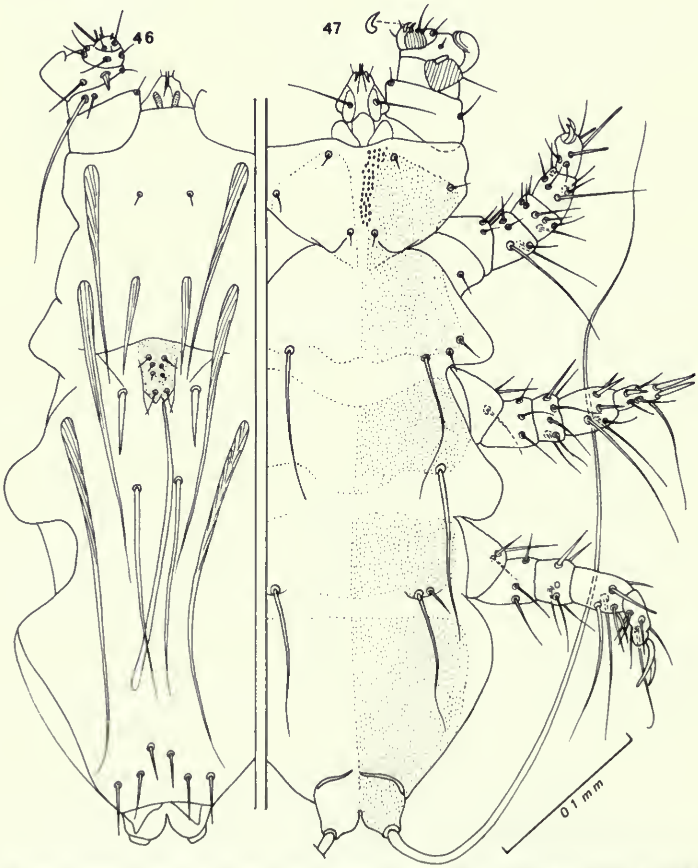
A. dasypterus (see Fain, 1973b) is well characterized in both sexes by the presence of large punctate areas on the ventral surface of the body, and by the shape of the chaetotaxy.

FEMALE (Figs 44 & 45). The holotype is 525 μm long and 204 μm wide. *Dorsum*. Anovulvar lobes triangular, well developed. There is a rounded punctate area in front of the anovulvar region. *Venter*. All the coxae bear large punctate shields, those of coxae III and IV are fused in the midline. Opisthosoma bearing a broad punctate median shield fused anteriorly with the shields of coxae IV. Gnathosoma small, longer ventrally than dorsally, distinctly widened posteriorly. Legs I: trochanters slightly produced anteriorly; tibiae with a large striated scale (modified hair) on its ventral side; the genu with a rather small striated external clasping process. Tarsi II–IV with two well-developed subequal claws.

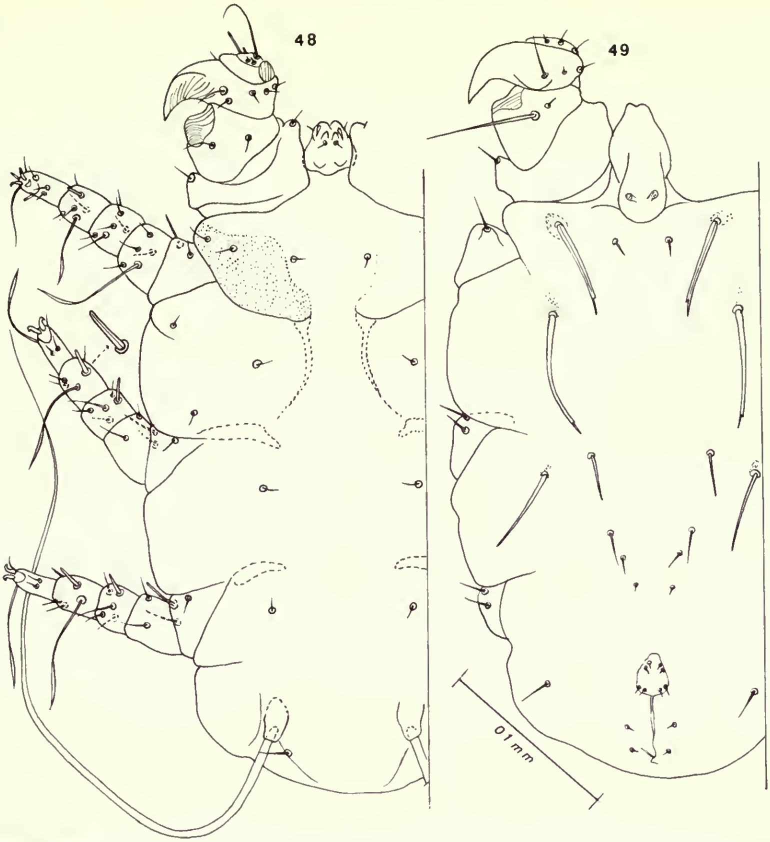
Chaetotaxy of the body. All the dorsal setae are striated and without a tooth, the external setae (*v e*, *sc e*, *l 1*) being longer than the internal ones. The *l 4* are present. The *ic 1* are small, the *ic 2*, *ic 3* and *ic 4* are thin and long. The *ic 4* is 26 μm long. Coxal setae: 3–3–0–1. The *g 1* and *g 2* are relatively long and situated in front of the *l 5* setae. *Chaetotaxy of legs II–IV*. Trochanters 3–3–3; femora 5–3–3; genua, tibiae and tarsi 7–6–6.

MALE (Figs 46 & 47). Allotype 450 μm long and 180 μm wide. Genital orifice at 15 μm in front of the *l 1* setae. The genital plate bears 4 pairs of small setae. Penis rather thick, nearly straight and 165 μm long. The *v i* are very small. The *v e*, *sc e* and *l 1* are only slightly inflated near their bases and they are 125 μm, 160 μm and 210 μm long. Legs as in the female but the claws II are shorter and stronger.

MATERIAL EXAMINED. Holotype ♀ and allotype ♂ from the dorsal surface of the body of *Dasypterus ega* (Chiroptera), BM no. 34.7.3.1, Trinidad. Holotype (no. 1976.12.20.1) and allotype (no. 1976.12.20.2) in BMNH.



Figs 46 & 47 *Acanthophthirius* (*Myotimyobia*) *dasypterus* Fain, allotype male. (46) dorsal view; (47) ventral view.



Figs 48 & 49 *Hipposiderobia phyllorhinae* Fain, holotype female. (48) ventral view; (49) dorsal view.

Genus *HIPPOSIDEROBIA* Dusbabek, 1968

Hipposiderobia phyllorhinae Fain, 1972

H. phyllorhinae (see Fain, 1972c) is distinguished from the other species of the genus (except *H. ceylonica* Radford) by its great size. From the latter species it may be separated by the small size of the *l 2* and *d 3* (which are strong in *ceylonica*) and by the different position of these setae on the body.

Female (Figs 48 & 49). The holotype is 366 μm long and 216 μm wide. *Dorsum*. Genital lobes lacking. Gnathosoma very short ventrally. Legs I: the tibiae bear ventrally a small striated scale (=modified hair). This scale is absent in the female of the other species of the genus. Legs short.

Chaetotaxy of the body. *v e*, *sc e* and *l 1* are 56 μm, 64 μm and 48 μm long respectively; the *d 1* and *d 2* thicker and longer than *l 1* and *l 2*. The *l 3* are 18 μm long. Genital hairs *g 3*–*g 7* very small. Coxae with 2–2–0–0 setae. The *ic 1*–*ic 4* are very small.

Chaetotaxy of the legs II–IV. Trochanters 3–3–3; femora 5–2–2; genua and tibiae 6–5–5; tarsi 6–4–4. The antero-ventral seta of tibia II–IV is strong and cylindrical.

Material examined. Holotype ♀ from the head of *Hipposideros diadema* (Chiroptera), in coll. Institut des Sciences naturelles de Belgique, New Guinea. Holotype in Institut des Sciences naturelles de Belgique, Bruxelles.

Hipposiderobia ceylonica (Radford, 1951)

Myobia ceylonica Radford, 1951.
Hipposiderobia ceylonica, Dusbabek, 1969.

This species has been described from *Hipposideros galeritus brachyotis* Dobson from Colombo, Ceylon, 17.v.1944.

We give here a drawing of that species from a female paratype (Figs 50 & 51) in the British Museum (Natural History).

This specimen is 291 μm long and 175 μm wide. The tarsus I bears one pair of very small claws, unlike in all the known species of the genus where these claws are lacking. Tarsi II–IV with two small and curved claws and a long pulvillus, as in the other species of the genus.

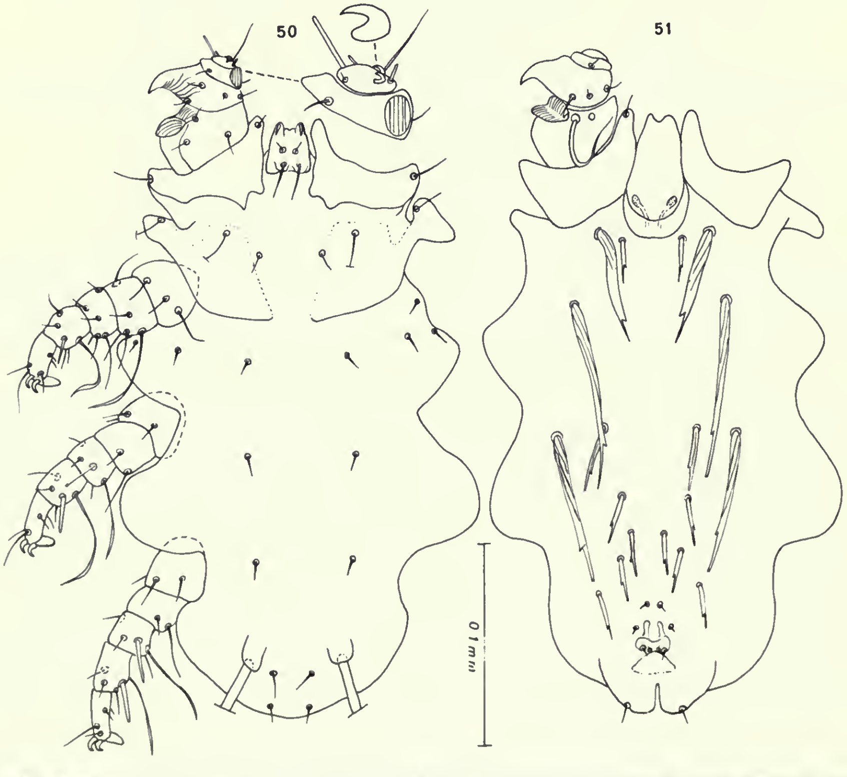
Chaetotaxy. v i toothed, relatively strong and 23 μm long. The *d 1*, *d 2* are 30–32 μm long and toothed, the *d 3*, *l 2*, *l 3* are toothed and 20–25 μm long. The *d 4* and *d 5* are very small. Coxae 2–3–0–0. *Legs II–IV.* Trochanters 3–3–3; femora 5–2–2; genua 6–5–5; tibiae 6–5–5; tarsi 5–4–4.

Genus ***EWINGANA*** Radford, 1948
Subgenus ***EWINGANA*** Radford, 1948

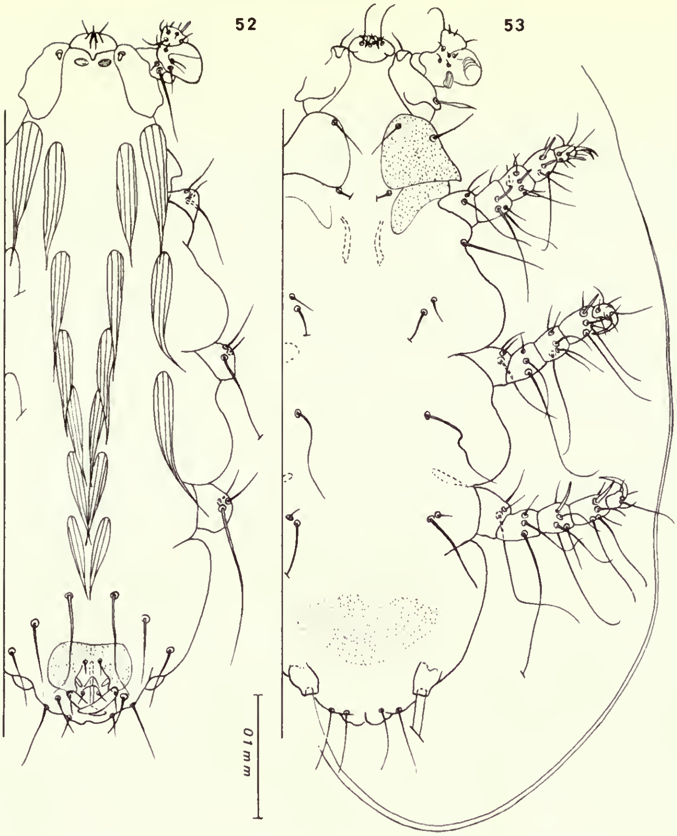
Ewingana (Ewingana) australis Fain, 1973

E. (*E.*) *australis* (see Fain, 1973b) is known only from the holotype female.

FEMALE (Figs 52 & 53). Holotype 525 μm long, 219 μm wide. *Dorsum.* The ano-vulvar lobes bear a strong hook. *Venter.* Coxae I sclerotized, with a strong lateral triangular projection. Opisthosoma with a punctate shield much wider than long. Legs I rather poorly developed; trochanters long and with several ventro-lateral projections, femur very narrow; tibio-tarsus separated from the genu by a constriction. The ventro-external hair of femur I is thin. Tarsus II with two slightly unequal claws. Tarsi III–IV with two very unequal claws. Gnathosoma much wider (35 μm) than long (23 μm, dorsally).



Figs 50 & 51 *Hipposiderobia ceylonica* (Radford), paratype female. (50) ventral view; (51) dorsal view.



Figs 52 & 53 *Ewingana* (*Ewingana*) *australis* Fain, holotype female. (52) dorsal view; (53) ventral view.

Chaetotaxy of the body. Dorsal hairs not toothed; *v i*, *v e*, *sc i*, *sc e*, *d 1–d 3*, *l 1*, *l 2* very wide and striated, *d 4*, *d 5*, *l 3*, *l 4* very thin and long. Coxae with 2–2–0–1 setae. The *ic 2–ic 4* are thin and long. *Legs*. Trochanters II–IV 3–3–3; femora 5–3–3; genua 7–6–6; tibiae 6–6–6; tarsi 7–6–6.

Material examined. Holotype ♀ from *Tadarida australis* (Chiroptera), BM no. 53.207–208, Central Highlands, New Guinea. Holotype (no. 1976.12.20.4) in BMNH.

Subgenus *DOREYANA* Dusbabek, 1968

Ewingana (*Doreyana*) *cheiromeles* Fain, 1972

E. (*D.*) *cheiromeles* (see Fain, 1972a, 1973c) is known only from the holotype female.

Female (Figs 54 & 55). Holotype 630 μm long, 285 μm wide. *Dorsum*. Ano-vulvar lobes bearing two strong hooks (setae *g 7*). *Venter*. Coxae I with well-developed punctate shields separated in the midline. A punctate, wider than long, median shield is present in the anterior region of the opisthosoma, this shield bears a median sclerotized band slightly bifid posteriorly (? genital opening). Gnathosoma much longer dorsally than ventrally with anterolateral corners produced. *Legs I*. Trochanters long. Tarsi II–IV ending in two very unequal claws.

Chaetotaxy of the body. Most of the dorsal setae bear a double oblique striation, they are strong and rather short and bear a small preapical tooth. Coxal setae: 2–2–0–1. The *ic* are long. *Leg chaetotaxy*. Trochanters 3–3–3; femora 5–3–3; genua 7–6–5; tibiae 6–6–6; tarsi 7–6–6.

Male. Unknown.

MATERIAL EXAMINED. Holotype ♀ from *Cheiromeles torquatus jacobsoni* (Chiroptera), BM no. 23.10.7.19, Lugu Simalur Is., N.W. Sumatra. Holotype (no. 1975.7.18.1) in BMNH.

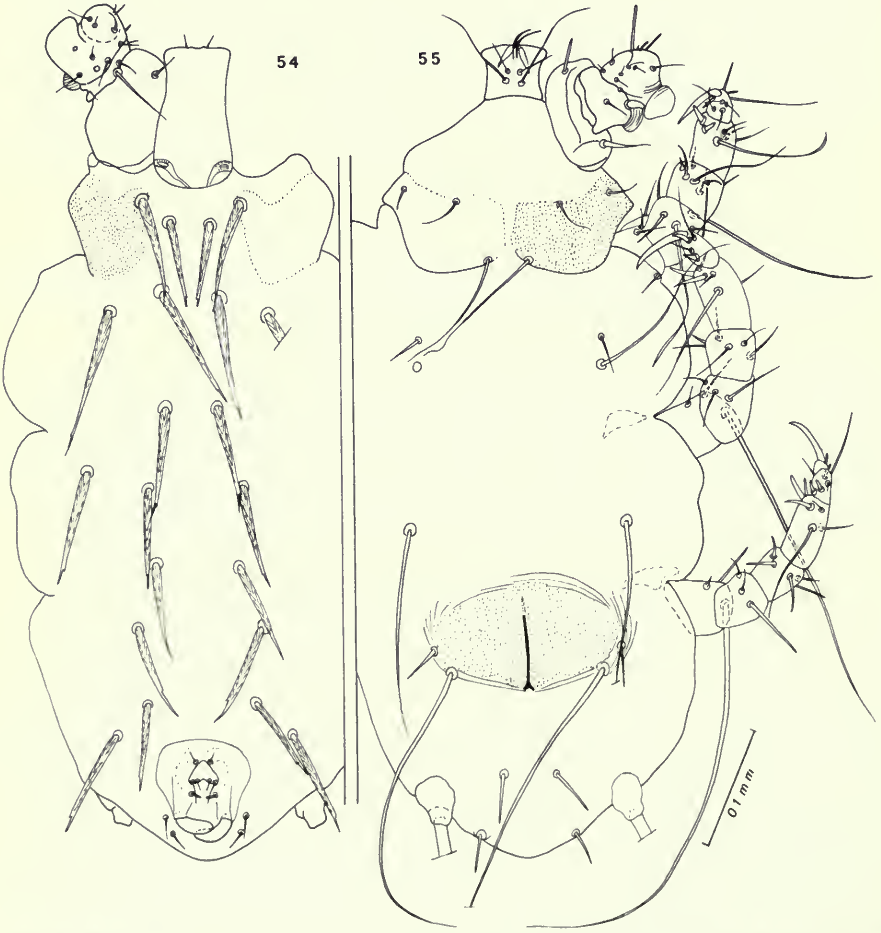
Ewingana* (*Doreyana*) *simalurensis Fain, 1973

E. (*D.*) *simalurensis* (see Fain, 1973b) is distinguished from *E.* (*D.*) *cheiromeles* in the female by the presence of a strong hook-like modified seta on the tibio-tarsus I, the greater length and the different shape of the gnathosoma, the much greater distance between the *v i*, the greater length of the *v i* and *v e*, the thinner shape of the *g 7*, etc.

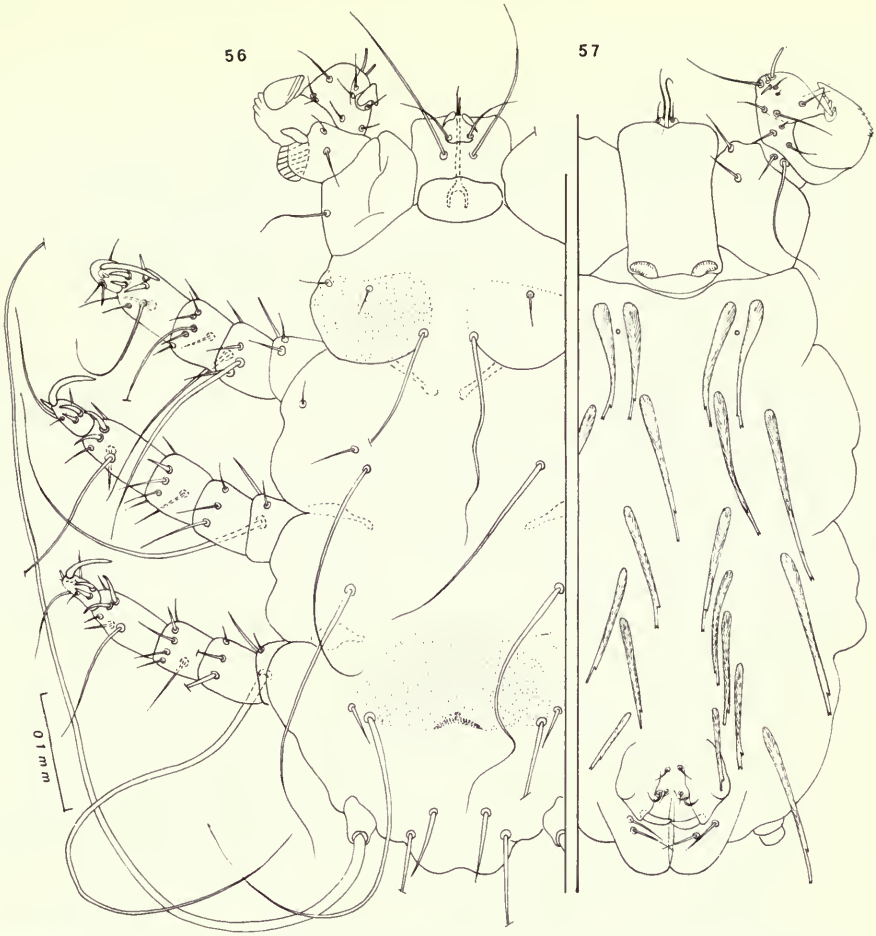
FEMALE (Figs 56 & 57). The holotype is 700 µm long and 320 µm wide. General aspect as in *E.* (*D.*) *cheiromeles*. The shields on coxae I are more spaced in the midline than in *cheiromeles*. The posteroventral shield does not bear a long median sclerotized band but along its posterior margin there is a transverse sclerotized band slightly concave in the midline. Gnathosoma only slightly expanded anteriorly and 126 µm long dorsally.

Chaetotaxy. The distance *v i*–*v i* is 66 µm (for 22 µm in *E.* (*D.*) *cheiromeles*). The *g 7* (= vulvar hooks) are thinner (7·5 µm thick) than in *cheiromeles* (16 µm thick).

MALE (Figs 58 & 59). The allotype is 510 µm long and 255 µm wide. Genital orifice situated at 30 µm behind the *sc e*. Behind the genital orifice there is a triangular area with an indistinct



Figs 54 & 55 *Ewingana* (*Doreyana*) *cheiromeles* Fain, holotype female. (54) dorsal view; (55) ventral view.



Figs 56 & 57 *Ewingana* (*Doreyana*) *simalurensis* Fain, holotype female. (56) ventral view; (57) dorsal view.

striation and which bears 3 pairs of short spines, the most anterior pair being situated at the level of the genital aperture. Penis straight, 120 μm long. The *v i* and *sc i* are very small. Coxae I punctate as in the female. There is also an oval-shaped and median punctate area at the level of the coxae IV. Legs as in the female except that the hook-like hair is replaced by a strong-conical spine.

Material examined. Holotype ♀, allotype ♂, 2 paratype ♀♀ and 2 paratype nymphs from the eyelid of *Cheiromeles torquatus jacobsoni* (Chiroptera), BM no. 23.10.7.10–14, Lugu Simalur Is., N.W. Sumatra. Holotype (no. 1975.7.18.4), allotype (no. 1975.7.18.5) and paratype nymph (no. 1975.7.18.6) in BMNH.

Ewingana (*Doreyana*) *longipilis* Fain, 1973

E. (*D.*) *longipilis* (see Fain, 1973b) is known only from the female holotype. It is well characterized by the unusual length of some idiosomal and leg setae.

Female (Figs 60 & 61). Idiosoma 630 μm long and 225 μm wide. *Dorsum*. The ano-vulvar lobes bear strong recurved setae. *Venter*. Coxa I with a punctate shield, the lateral surface only slightly produced. The anterior opisthosomal shield is wider than long. Legs I well developed; the trochanter without ventral processes; the external striated process of femur is short and wide.

Legs II–IV long. Tarsi II–IV with two very unequal claws. Gnathosoma longer dorsally (84 μm) than wide (maximum width 54 μm).

Chaetotaxy of the body. Most of the dorsal setae are striated and toothed. The *v i* and *v e* are subequal (85–90 μm long). Coxal setae: 2–2–0–1, the external coxal I are small conical spines. The *ic 3* and *ic 4* are 250 μm and 450 μm long respectively. *Leg chaetotaxy.* Number of setae as in *E.* (*E.*) *australis*, many of these setae are long or very long: the dorsal setae of trochanters III–IV are more than 300 μm long, the posterior setae of femura IV are at least 400 μm long.

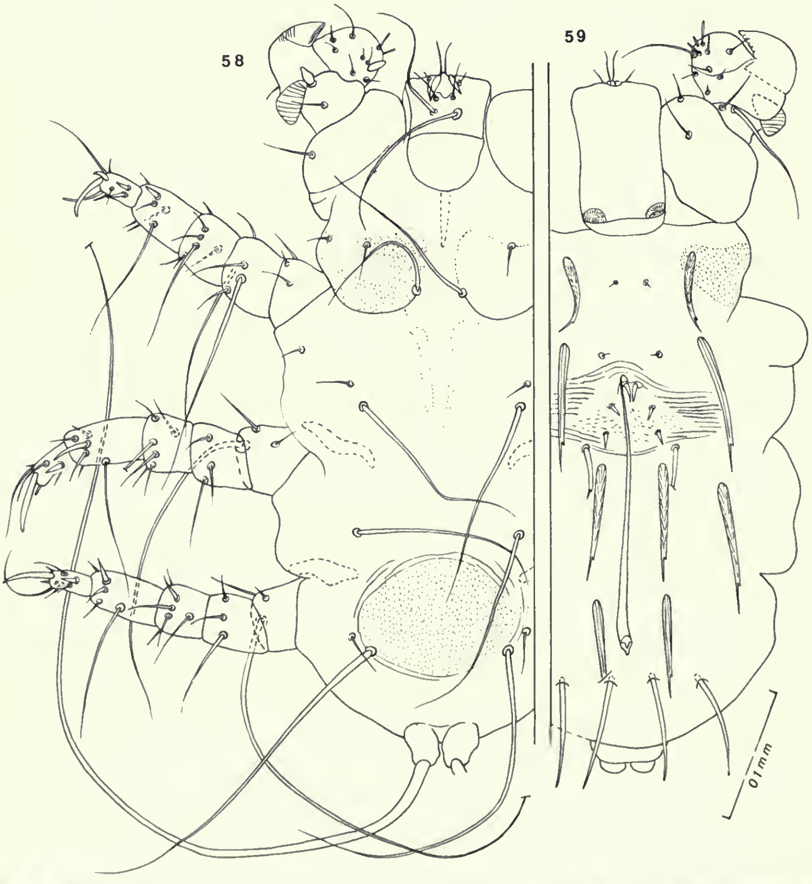
MATERIAL EXAMINED. Holotype ♀ from *Tadarida australis* (Chiroptera), BM no. 53.207–209, Central Highlands, New Guinea. Holotype (no. 1975.7.18.2) in BMNH.

Genus *UGANDOBIA* Dusbabek, 1968

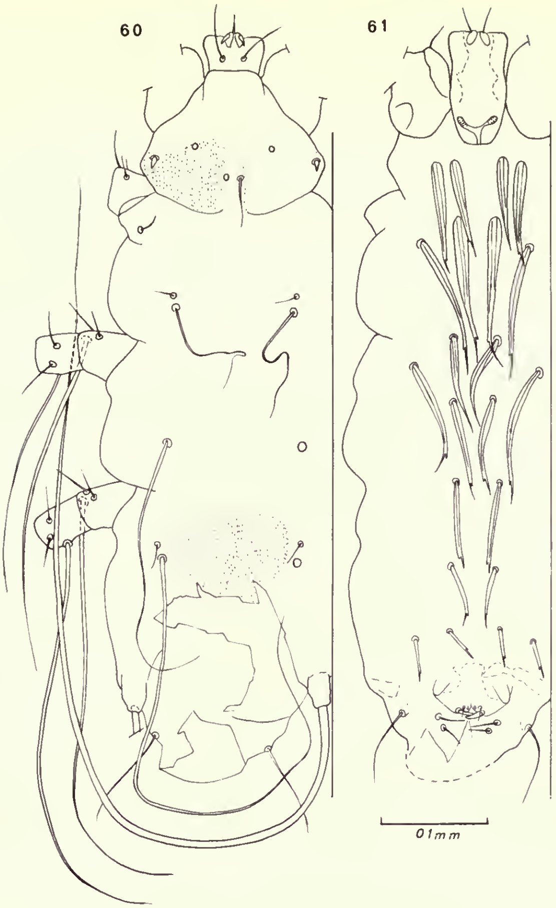
Ugandobia balionycteris Fain, 1973

U. balionycteris (see Fain, 1973b) is known from the holotype female and paratypes nymphs. It is close to *U.* (*U.*) *ituriensis* Fain but is distinguished from that species mainly by the shape of the dorsal setae which are thicker and have a much longer inflated part.

FEMALE (Figs 62 & 63). The holotype is 360 μm long and 146 μm wide. *Dorsum.* Ano-vulvar lobes are poorly developed. *Venter.* Coxae I sclerotized and produced laterally. There is an internal sclerotized insemination apparatus in the opisthosoma. Legs I with a long trochanter distinctly produced anteriorly and with a triangular projection in its postero-lateral part. Legs II with two



Figs 58 & 59 *Ewingana* (*Doreyana*) *simalurensis* Fain, allotype male. (58) ventral view; (59) dorsal view.



Figs 60 & 61 *Ewingana* (*Doreyana*) *longipilis* Fain, holotype female. (60) ventral view; (61) dorsal view.

unequal claws, legs III–IV with one long claw. Gnathosoma narrow, 25 µm long (ventrally), slightly widened posteriorly (maximum width 18 µm).

Chaetotaxy of the body. Most of the dorsal setae are striated and toothed. The *v i* are short and narrow. The *v e* are the widest (8·5 µm wide) of the dorsal setae. The *d 1, d 2, l 1, l 2* setae are foliaceous and striated. The *d 3–d 5* and *l 3, l 4* are thinner, not striated but they present a tooth. Coxal setae: 2–2–0–1. Legs: trochanters 3–3–3; femora 5–1–1; genua 6–6–5; tibiae 6–6–6; tarsi 7–6–6.

MATERIAL EXAMINED. Holotype ♀ and paratype nymph from *Balionycteris maculata* (Chiroptera), BM no. 60.739–758, Kepong, Selangor, Malaya. Holotype (no. 1975.7.18.25) in BMNH.

Ugandobia emballonurae Fain, 1972

U. emballonurae (see Fain, 1972c) is known only from the holotype male.

MALE (Figs 64 & 65). The holotype is 254 µm long and 105 µm wide. Genital orifice situated at 15 µm behind the *sc e*. Penis thin, curved apically, 135 µm long. The genital plate bears 4 pairs of unequal setae. Coxa I with a strong lateral hooklike backwards-directed process. Trochanters I very wide (maximum width 32 µm, measured close to their base), with a posterior margin strongly incised and with a very strong triangular lateral process directed obliquely and backwards. Legs II bearing two subequal claws, legs III–IV with one long claw.

Chaetotaxy of the body. The *v e*, *sc e* and *l 1* are 73 µm, 62 µm and 48 µm long respectively. These setae, as well as the *d 1* and the *d 2*, are toothed. Coxae with 2–2–0–1 setae. The *ic 1–ic 3* are short (less than 12 µm), the *ic 4* are thicker and longer (18 µm long). *Legs II–IV*: trochanters 3–3–3; femora 5–1–1; genua and tibiae 6–6–6; tarsi 7–6–6.

Material examined. Holotype ♂ from *Emballonura nigrescens* (Chiroptera), in coll. Institut des Sciences naturelles de Belgique, Ile de Bougainville, New Guinea. Holotype in the Institut des Sciences naturelles de Belgique, Bruxelles.

Genus *EUDUSBABEKIA* Jameson, 1971

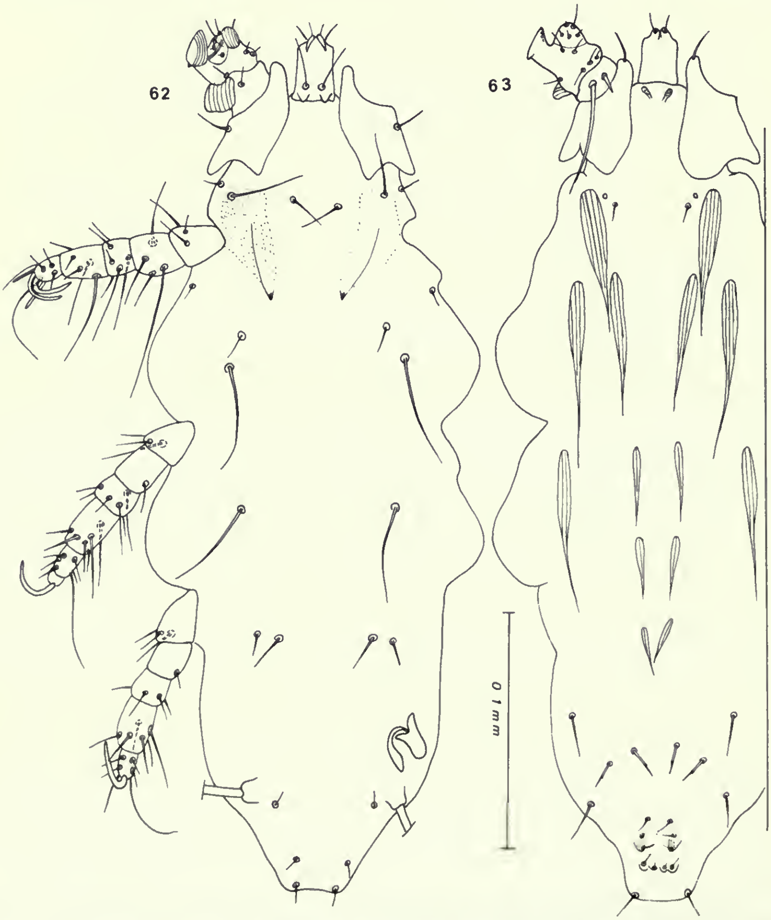
Jamesonia Dusbabek, 1967.
Eudusbabekia Jameson, 1971, nom. nov. pro. *Jamesonia* Bolivar, 1909, praeocc.

This genus at present comprises 22 species, all living on South American bats of the family Phyllostomatidae.

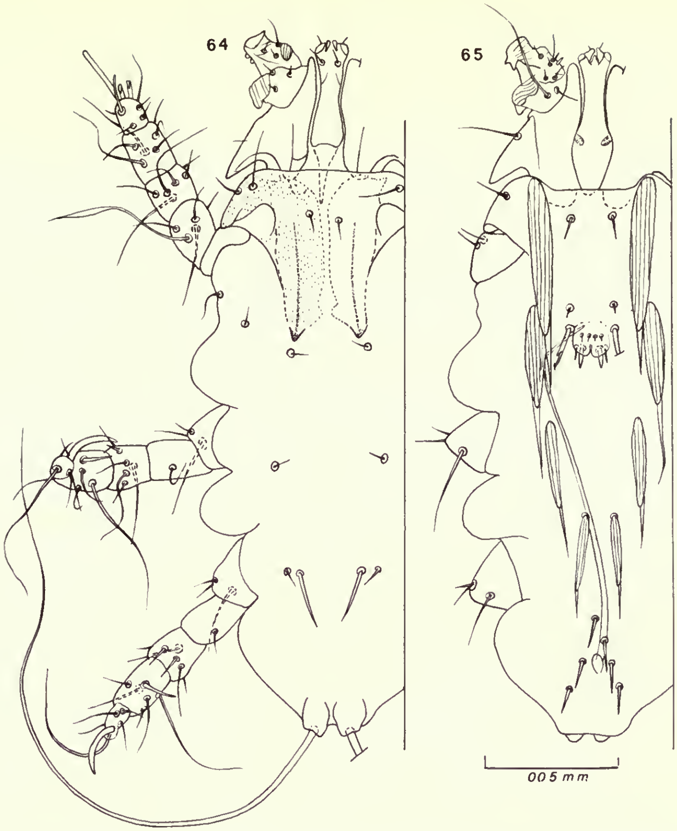
Key to the species of *Eudusbabekia*

Females

1 Ventral surface with patch of 45 short and broad setae in addition to the ordinary setae . . . *E. lepidoseta* Jameson, 1971
– Ventral surface bearing only the ordinary setae 2



Figs 62 & 63 *Ugandobia balionycteris* Fain, holotype female. (62) ventral view; (63) dorsal view.



Figs 64 & 65 *Ugandobia emballonurae* Fain, holotype male. (64) ventral view; (65) dorsal view.

2 Setae *sc i* and *v i* very small, short and thin . . . . . . **_E. cernyi_** (Dusbabek, 1967)

– Setae *sc i* and *v i* unequal, the *sc i* being foliate-striate 3

3 Setae *ic 3* and *ic 4* thin and very short . . . . **_E. danieli_** (Dusbabek, 1967)

– Setae *ic 3* and *ic 4* long 4

4 Setae *sc e* and *l 1* distinctly expanded anteriorly and strongly and abruptly attenuated posteriorly 5

– Setae *sc e* and *l 1* more or less cylindro-conical, regularly attenuated posteriorly. . . . 13

5 The *sc i* distinctly wider than *sc e* 6

– The *sc i* narrower or of the same width as the *sc e* 7

6 Anterior extremity of trochanter I very wide, truncate, with a straight border. The *v i* distinctly separated from the *v e*. The *sc i* slightly shorter (75 μm) than *sc e* and wider (9 μm) than the latter (6 μm). The *l 3* very thin . . . . . . **_E. ecuadorensis_** Fain, 1973

– Anterior extremity of trochanter I forming a long cone directed inwards. The *v i* close to the *v e*. The *sc e* 1·5 times longer than the *sc i* and distinctly narrower than the latter. The *l 3* thick and striated . . . . **_E. rosickyi_** (Dusbabek, 1967)

7 The *sc i* longer than the *sc e*. 8

– The *sc i* shorter than the *sc e* 9

8 The *v e*, *sc i*, *sc e*, *l 1* narrower. Claws short and thick. Gnathosoma narrower, rounded laterally and 33 μm wide . . . . **_E. urodermae_** Fain, 1972

– The *v e*, *sc i*, *sc e*, *l 1* wider. Claws longer and thinner. Gnathosoma angulated laterally and 43 μm wide . . . . **_E. viguerasi_** (Dusbabek, 1967)
E. macrophyllum Dusbabek & Lukoschus, 1975

9 Trochanters I ending anteriorly into a voluminous conical lobe rounded apically . . . 10

– Trochanter I not ending into a conical lobe anteriorly 12

10 The *sc e* approximately twice longer than the *sc i*. Anterior prolongation of trochanter I wide and very long. Gnathosoma rounded laterally. Ratio length–width of the body: 1·8 ***E. phyllodermae*** Fain, 1973

– The *sc e* slightly longer and thicker than *sc i*. Anterior prolongation of trochanter I narrower and shorter . . . 11

11 Body short and wide (ratio length–width = 1·6). The *sc i* and *sc e* subequal and situated on the same line. The *d 1* situated in front of *l 1*. The *l 2* inflated medially. The *l 3* are short ***E. phyllostomi*** Jameson, 1971

– Body elongated (ratio length–width = 2·4). The *sc i* and *sc e* more unequal and the *sc i* are situated behind the *sc e*. The *d 1* are situated behind the *l 1*. The *l 2* not inflated. The *l 3* are long . . . ***E. centurio*** Fain, 1973

12 The *sc e* are twice as long as the *sc i*. The *v i* are more spaced . ***E. samsinaki*** (Dusbabek, 1967)

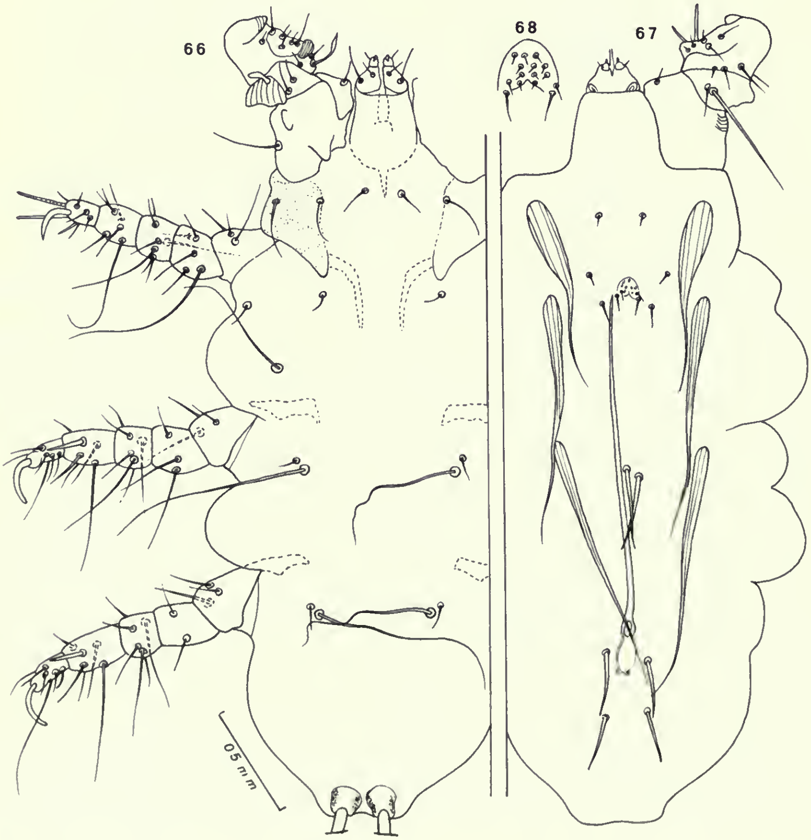
– The *sc e* are 1·5 times as long as the *sc i*. The *v i* are more close to each other ***E. arganoi*** Vomero, 1972

13 The *v i* are thick and striated. Postero-lateral angle of coxa I strongly produced. Setae *sc i* distinctly thicker than *sc e*. Body length 306 μm . . . ***E. saguei*** (Dusbabek, 1967)

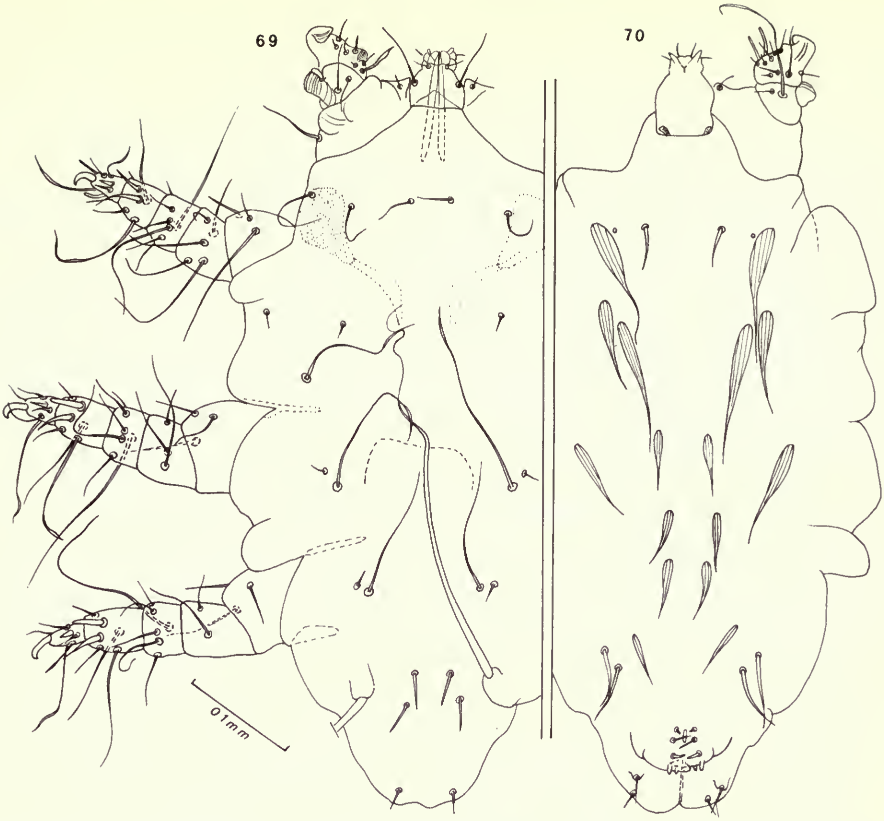
– The *v i* are thin. Postero-lateral angle of coxa I not produced. Setae *sc i* very slightly thicker than *sc e*. Body length 330–360 μm . . . 14

14 Gnathosoma abruptly widened in its posterior half. Trochanter I long, distinctly produced anteriorly . . . 15

– Gnathosoma not abruptly widened in its posterior half. Trochanter I short, very slightly produced anteriorly . . . ***E. jimenezi*** (Dusbabek, 1967)



Figs 66–68 *Eudusbabekia urodermae* Fain, holotype male. (66) ventral view; (67) dorsal view; (68) genital setae.



Figs 69 & 70 *Eudusbabekia urodermae* Fain, allotype female. (69) ventral view; (70) dorsal view.

15 The *sc e* are twice as long as the *sc i*. The *d 1*, *d 2*, *d 3* and *l 2* with a bulbous thickening in their median part. The *v i* are situated close to the *v e*. Trochanter I with a strong, triangular anterior projection . . . . ***E. chrotopterus*** Fain, 1973
– The *sc e* are distinctly less than twice as long as the *sc i* 16
16 The *v i* are closer to the *v e* than to the midline . ***E. brachyotis*** Dusbabek & Lukoschus, 1975
– The *v i* are closer to the midline than to the *v e* 17
17 Setae *d 1*, *d 2*, *d 3* and *l 2* with a bulbous thickening in their median part
E. hastata Dusbabek & Lukoschus, 1975
– Setae *d 1*, d *2*, *d 3* and *l 2* without distinct bulbous thickenings in their median part . . 18
18 Setae *v e* moderately inflated. Dorso-anterior seta of trochanter I not toothed ***E. mimon*** Fain, 1973
E. trachopis Dusbabek & Lukoschus, 1975
E. anthorhinae Dusbabek & Lukoschus, 1975
– Setae *v e* very wide. Dorso-anterior seta of trochanter I toothed
E. micronycteridis Dusbabek & Lukoschus, 1975

Eudusbabekia urodermae Fain, 1972

MALE (Figs 66–68). The holotype of *E. urodermae* (see Fain, 1972a) is 315 μm long and 150 μm wide. *Dorsum*. Genital orifice situated on the same transverse line as the *sc e*. The genital plate bears 12 very small hairs, it is followed by two pairs of short and thin setae, probably the *d 1* and *d 2* displaced anteriorly. *Venter*. Coxae I distinctly sclerotized. *Legs I*. Trochanter I slightly produced anteriorly, bearing a conical prolongation on ventral surface. The clasping surfaces of femur and genu I are poorly developed; the tibio-tarsus bears ventrally a striated scale. Tarsi

II–IV with one claw normally developed. Gnathosoma short, distinctly expanded in its posterior half.

Chaetotaxy of the body. The *v e* are much wider than the *sc e* and the *l 1*, the latter being subequal to each other. The *v i* and *sc i* are very small. Coxae I–IV with 2–2–1–1 setae respectively. The *ic 1* and *ic 2* are short and thin, the *ic 3* and *ic 4* are long and thin. Legs II–IV (number of setae): trochanters 3–3–3; femora 5–3–2; genua 7–6–6; tibiae 6–6–6; tarsi 7–6–6.

FEMALE (Figs 69 & 70). The allotype is 480 μm long and 250 μm wide. *Dorsum*. Vulva with 2 membranous lobes. *Venter*. Coxae I as in the male. Gnathosoma longer than in the male. Legs thicker than in the male with shorter and thicker claws.

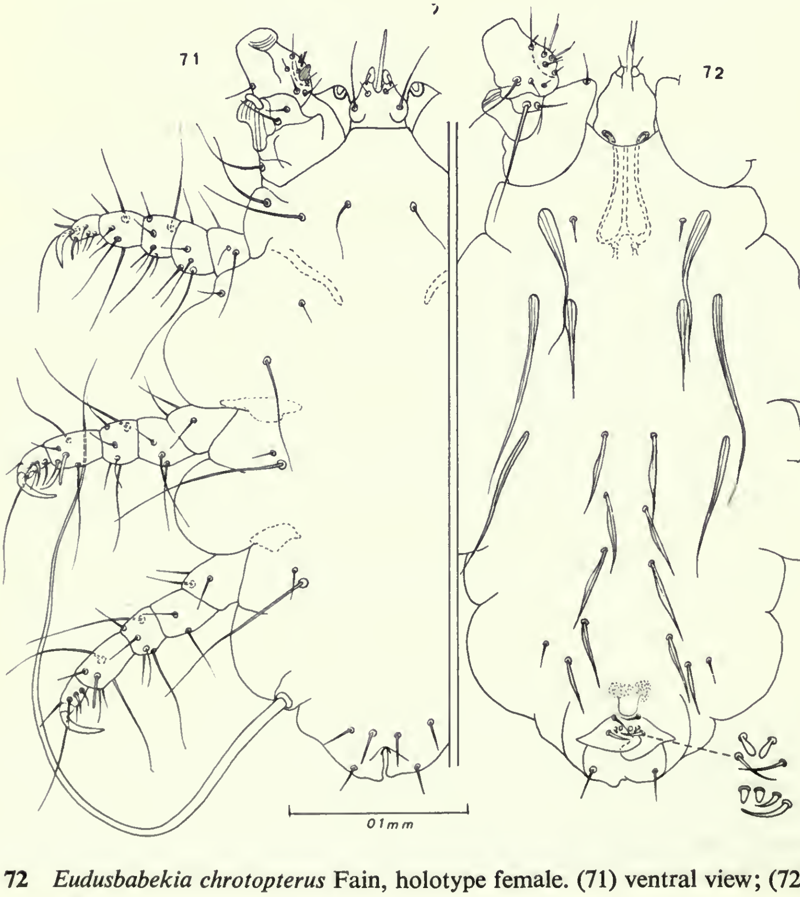
Chaetotaxy of body. *v i* small; *sc i* as wide as the *sc e* but slightly longer than the latter. The *l 4* is lacking. Ventral setae as in the male but the *g 1*, *g 2* and *g 3* are present in the posterior part of the body. Leg chaetotaxy as in the male but some setae (ventral setae of tibiae II–IV) are stronger.

MATERIAL EXAMINED. Holotype ♂, allotype ♀, 2 paratype ♀♀ and 4 paratype nymphs from *Uroderma magnirostrum* (Chiroptera), Mocambo Forest, Belém, Brazil, collected 20.iii.1968 (Dr T. Aitken). Types in U.S. National Museum.

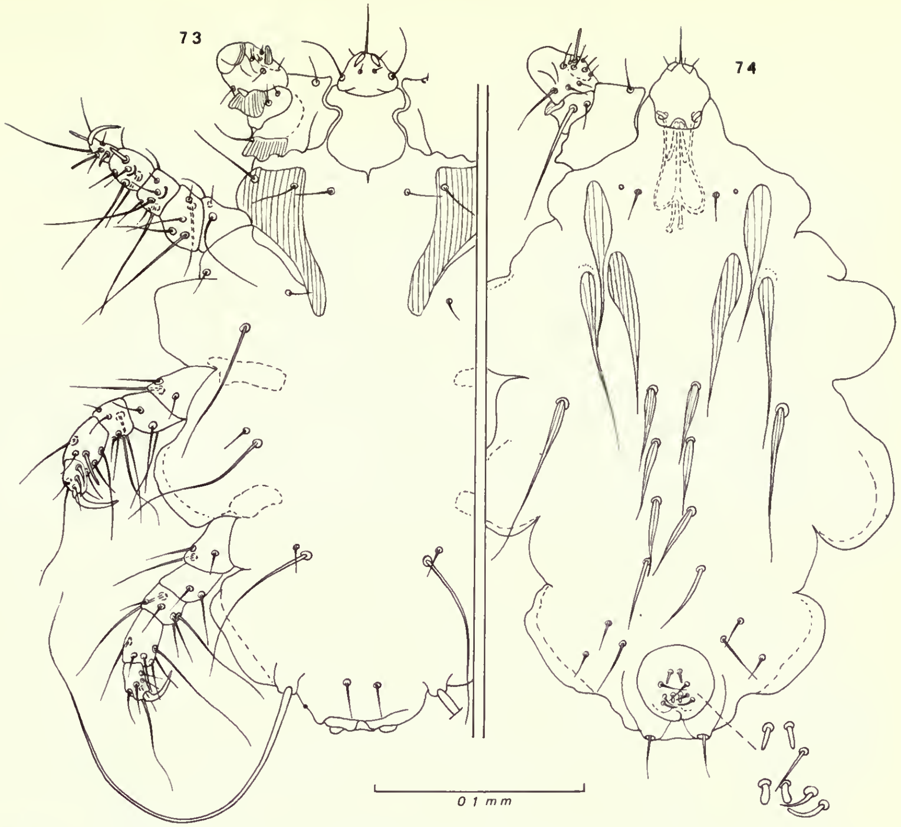
Eudusbabekia chrotopterus Fain, 1973

E. chrotopterus (see Fain, 1973b) represented only by the holotype female.

FEMALE (Figs 71 & 72). The holotype is 360 μm long and 225 μm wide. *Dorsum*. Ano-vulvar lobes wide, rounded apically. *Venter*. Coxae I with a ventro-lateral projection directed pos-



Figs 71 & 72 *Eudusbabekia chrotopterus* Fain, holotype female. (71) ventral view; (72) dorsal view.



Figs 73 & 74 *Eudusbabekia ecuadorensis* Fain, holotype female. (73) ventral view; (74) dorsal view.

teriorly. Gnathosoma abruptly expanded in its posterior part, with two small ventral lobes. Legs ; trochanters I long forming anteriorly a broad cone attenuated apically. Legs II–IV bearing a well-developed claw.

Chaetotaxy. v i short and narrow and situated close to the *v e*. The *sc e* much longer (120 μm) than the *sc i* (51 μm). The *d 1*, *d 2*, *d 3*, *l 3* are 40–45 μm long and they present a bulb in their median part. The *l 4* is lacking. The internal coxal II is longer (45 μm) than the *ic 2* (12 μm). The *ic 3* and *ic 4* are 90 μm long. Number of setae on legs II–IV as in *E. urodermae*.

MALE. Unknown.

MATERIAL EXAMINED. Holotype ♀ from *Chrotopterus auritus guianae* (Chiroptera), BM no. 65.629–630, near Bartica, Guyana. Holotype (no. 1975.7.18.11) in BMNH.

Eudusbabekia ecuadorensis Fain, 1973

E. ecuadorensis (see Fain, 1973b) is represented only by the holotype female.

FEMALE (holotype) (Figs 73 & 74). Length 309 μm, width 192 μm. *Dorsum.* Vulvar lobes long, conical with rounded extremities. *Venter.* Coxae I well sclerotized and with longitudinal striations. Legs II–IV rather short, ending in a medium-sized claw. Leg I: trochanter with a serrate postero-ventral margin, its anterior extremity very broad, with a straight border; its internal surface is deeply incised. In ventral view the gnathosoma is wider than long and enlarged posteriorly. In dorsal view the gnathosoma is longer than wide.

Chaetotaxy. The *v e*, *sc i*, *sc e* and *l 1* are subequal in length (75–80 μm). The *sc i* is wider (10 μm) than the *sc e* (6 μm). The *d 1*, *d 2*, *d 3* and *l 2* are 40 μm long. *Ventrally. ic 3* and *ic 4* are 65 μm and 90 μm long respectively and very thin.

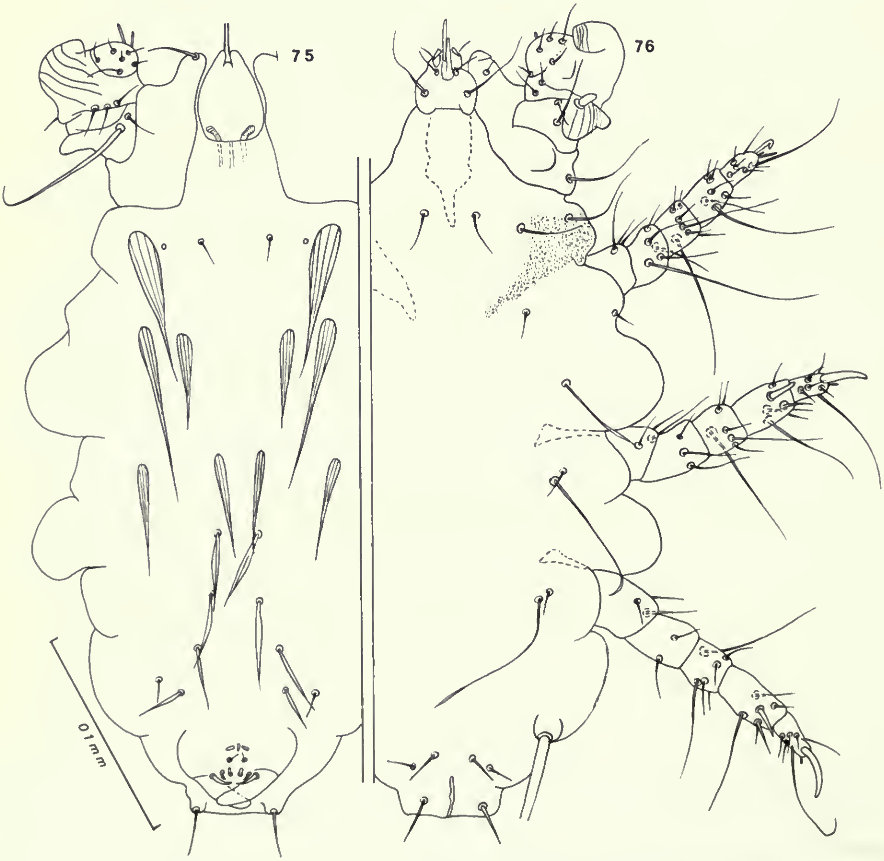
MALE. Unknown.

MATERIAL EXAMINED. Holotype ♀ from *Mormoops megaphylla* (Chiroptera), BM no. 98.9.5.10, Paramba, Ecuador. Holotype (no. 1975.7.18.12) in BMNH.

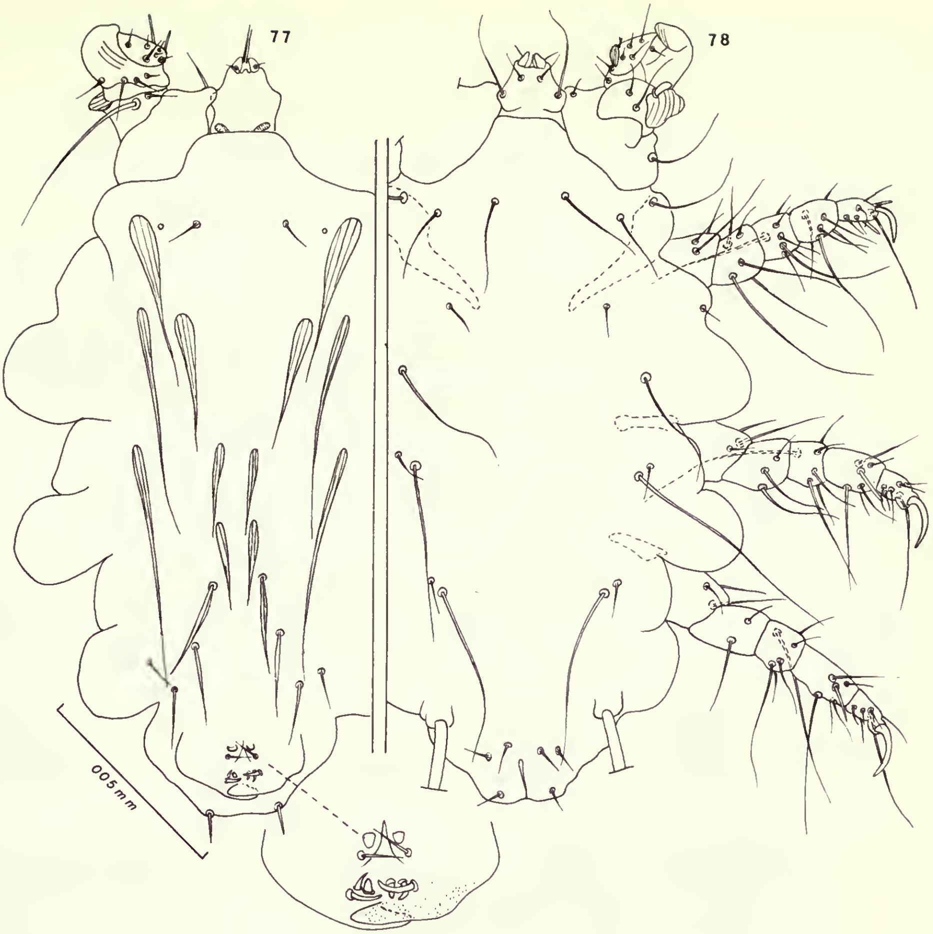
Eudusbabekia phyllodermae Fain, 1973

E. phyllodermae (see Fain, 1973b) is known only after the female.

FEMALE (holotype) (Figs 75 & 76). Length 375 μm, width 190 μm. *Dorsum.* Ano-vulvar lobes long and rather narrow. *Venter.* The sclerotization of coxae I is triangular shaped with a narrow postero-internal prolongation. Posterior margin of the body straight. Gnathosoma widened posteriorly, shorter ventrally than dorsally with two posterior ventral lobes. Legs: trochanters I with a long rounded antero-internal prolongation. Legs II–IV with a terminal claw, the claws of legs III–IV much longer and stronger than that of leg II. Tibiae III–IV with two rather strong ventral spines.



Figs 75 & 76 *Eudusbabekia phyllodermae* Fain, holotype female. (75) dorsal view; (76) ventral view.



Figs 77 & 78 *Eudusbabekia mimon* Fain, holotype female. (77) dorsal view; (78) ventral view.

Chaetotaxy of the body. v i very thin and short; *v e* wide and striated and strongly attenuated posteriorly. The *sc i* distinctly shorter than *sc e*. The *d 2* and *l 2* distinctly inflated in their median part. The coxal II internal, the *ic 3* and *ic 4* are long and foliaceous apically. Number of setae on the legs II–IV as in *E. urodermae*.

MATERIAL EXAMINED. Holotype ♀ and paratype ♀ from the dorsum of *Phylloderma stenops* (Chiroptera), BM no. 65.626–628, near Bartica, Guyana. Holotype (no. 1975.7.18.14) in BMNH.

Eudusbabekia mimon Fain, 1973

FEMALE (Figs 77 & 78). The holotype of *E. mimon* (see Fain, 1973b) is 330 μm long and 204 μm wide. *Dorsum*. Vulvar lobes shorter and more conical than in *E. phyllodermae*. *Venter*. The sclerotized area of the coxa I is long and narrow. Gnathosoma slightly longer dorsally than ventrally, distinctly enlarged in its posterior half. Legs: trochanters I long but only very slightly produced anteriorly. Tarsi II–IV with one well-developed claw, the claws II being only slightly smaller than claws III and IV. Tibiae III–IV with a ventral narrow cylindrical hair.

Chaetotaxy of the body. v i very thin and short; *v e* are the widest setae of the body; *sc i* slightly thicker and much shorter than *sc e*; the *l 4* are missing. The *ic 3* and *ic 4* are long, very thin and foliaceous apically.

Chaetotaxy of legs (number of setae). As in *E. urodermae.*

MALE (Figs 79–81). Allotype 252 μm long and 150 μm long. The *v i* and *sc i* are very thin and short (3–5 μm). Genital orifice situated at 21 μm behind the *sc e*. In front of the genital orifice there is a small sclerotized plate bearing 6–7 pairs of very small spinules and postero-laterally 2 pairs of thin setae 10–12 μm long, one antero-external and one postero-internal.

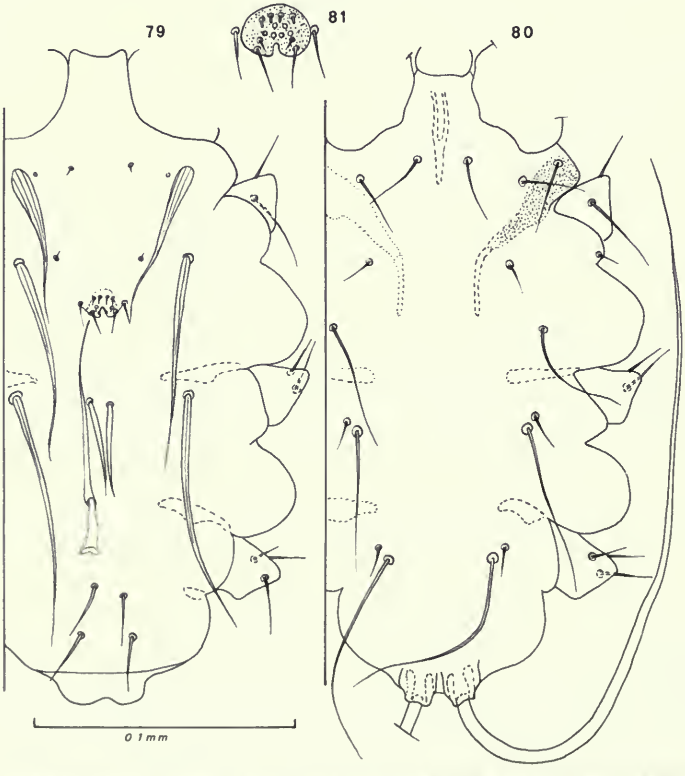
MATERIAL EXAMINED. Holotype ♀, allotype ♂, paratype ♂ and 2 paratype nymphs from *Mimon bennetti* (Chiroptera), BM no. 65.618, near Bartica, Guyana. Holotype (no. 1975.7.18.13) in BMNH.

Eudusbabekia centurio Fain, 1973

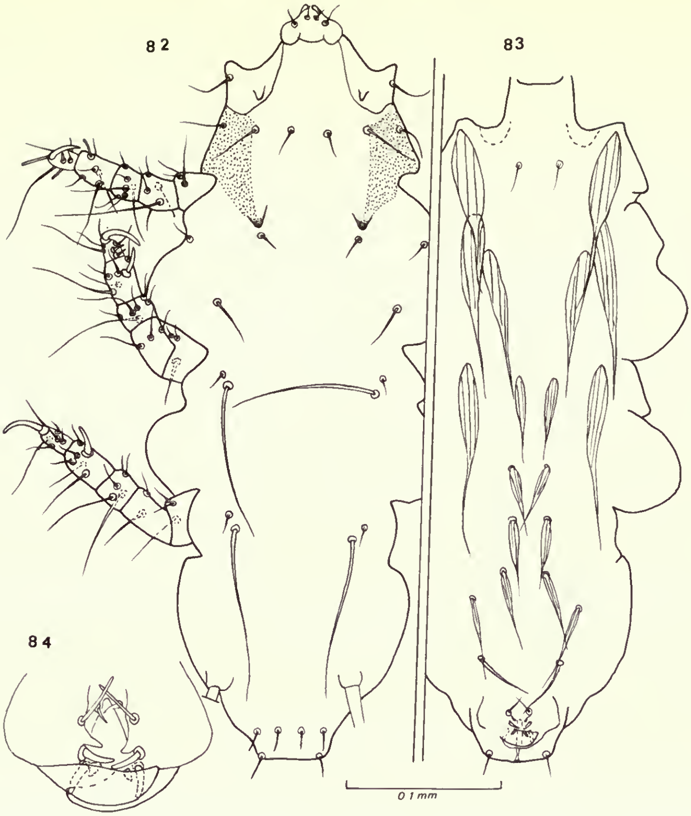
FEMALE (Figs 82–86). The holotype of *E. centurio* (see Fain, 1973b) is 450 μm long and 187 μm wide. *Dorsum*. Ano-vulvar lobes strongly developed. *Venter*. Coxa I partly sclerotized, with a longitudinal internal crest. Gnathosoma pentagonal, wider (36 μm) than long (33 μm long dorsally and 15 μm ventrally) and bearing two postero-lateral ventral lobes. Legs I. Trochanters I very long, strongly produced anteriorly and presenting ventrally two short triangular or conical processes. The complex tarsus–tibia–genu I is unusually long. Legs II–IV narrow, ending in a well-developed claw.

Chaetotaxy of the body. The dorsal striated setae are particularly wide and long. The *sc i* are thinner than the *sc e*. The *l 4* are missing. The *ic 1* are thin and short (15 μm).

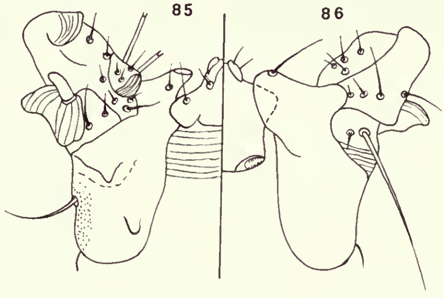
Chaetotaxy of the legs. There is a strong spine on the ventral surface of tibiae II and III.



Figs 79–81 *Eudusbabekia mimon* Fain, allotype male. (79) dorsal view; (80) ventral view; (81) genital setae



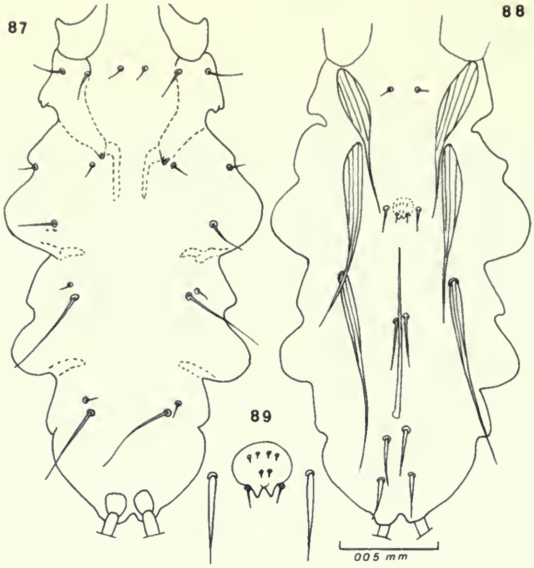
Figs 82–84 *Eudusbabekia centurio* Fain, holotype female. (82) ventral view; (83) dorsal view; (84) genital setae.



Figs 85 & 86 *Eudusbabekia centurio* Fain, holotype female, legs I and gnathosoma. (85) ventral view; (86) dorsal view.

Male (Figs 87–89). Allotype 279 μm long and 129 μm wide. Genital aperture situated at 36 μm behind the anterior extremity of the *sc e*. The sclerotized plate in front of this orifice bears 3 or 4 pairs of very short and poorly distinct spinelets and one pair of small setae, 5 μm long. At each side of the orifice is a cylindro-conical hair 10–12 μm long. Penis very narrow, straight and 65–70 μm long.

Material examined. Holotype ♀, paratype ♀, allotype ♂ and 5 paratype nymphs from the dorsum of *Centurio senex* (Chiroptera), BM no. 1938.12.23.15, Tobago. Holotype (no. 1975.7.18.7), allotype (no. 1975.7.18.8) and two paratype nymphs (nos 1975.7.18.9–10) in BMNH.



Figs 87–89 *Eudusbabekia centurio* Fain, allotype male. (87) ventral view; (88) dorsal view; (89) genital setae.

Acknowledgements

I wish to thank Dr G. B. Corbet and Mr J. E. Hill of the Mammal Section and Mr K. H. Hyatt of the Arachnida Section, British Museum (Natural History), for allowing me to collect the mites described in this paper. I am also very grateful to Miss J. M. Ingles for her valuable help in providing the exact names of the mammalian hosts.

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Contents

The genus names *Calicella* Hincks and *Calycella* Hincks (Coelenterata: Hydrozoa). By P. F. S. Cornelius 233

On the identity of the spider *Emertonius exasperans* Peckham & Peckham (Araneae: Salticidae). By F. R. Wanless 235

A revision of the spider genus *Bocus* Simon (Araneae: Salticidae). By F. R. Wanless 239

A revision of the spider genus *Sobasina* (Araneae: Salticidae). By F. R. Wanless . 245

A revision of the spider genus *Marengo* (Araneae: Salticidae). By F. R. Wanless . 259

A new species of *Steganacarus* (Acari, Cryptostigmata) from Israel. By B. W. Parry 279

The larval development of the portunid crab *Macropipus pusillus* (Leach) reared in the laboratory. By A. L. Rice & R. W. Ingle 287

The genus names *Calicella* Hincks and *Calycella* Hincks (Coelenterata: Hydrozoa)

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Synopsis

The correct combination to be applied to a common British hydroid species is shown to be *Calycella syringa*, while the generic name *Calicella* is considered a junior subjective synonym of *Lafoea*.

Discussion of nomenclature

There seems some confusion currently concerning the correct spelling of the genus name of the common British hydroid *Calycella syringa* (Linnaeus, 1767). The name *Calicella* was introduced by Hincks (1859a, b) without description or indication, but was validated later when Hincks (1861) provided a description. Hincks (1861) designated *Sertularia dumosa* Fleming, 1820, as type-species of *Calicella*. Thus, as both he and Allman noted later (Allman, 1864 : 375; Hincks, 1868 : 198, 205–206), *Calicella* can be regarded a junior subjective synonym of *Lafoea* Lamouroux, 1821. (Synonymies of the genus *Lafoea* and species *L. dumosa* were given by Cornelius, 1975.)

Hincks (in Allman, 1864 : 375; Hincks, 1868 : 205) therefore later proposed a new genus bearing the new name *Calycella*, to accommodate the remaining species originally included in *Calicella*. These comprised *Sertularia syringa* Linnaeus, 1767, and another species which does not enter the present argument. Hincks (1868) designated *S. syringa* as type-species of *Calycella*. The species seems well founded and should of course be known by the combination *Calycella syringa* (Linnaeus, 1767). The majority of authors subsequent to Hincks (1868) have in fact used this combination, but the remarks of Bedot (1910 : 248) implied that *Calycella* should be considered an emendation of *Calicella*. As explained above it should be regarded as a distinct taxon, with different type-species, and is in fact in a different family.

Some confusion in the early literature surrounding the specific name *syringa* should also be noted here. Ellis (1755 : 24–25, pl. 14, figs B, b) provided both description and illustration of *C. syringa*, which he called 'clustering polype coralline'. However, Linnaeus (1758) omitted to provide a binominal for the species, although giving names to most other of Ellis' species. Pallas (1766 : 122) shortly afterwards proposed the name *Sertularia volubilis* for Ellis' species; but Linnaeus (1758 : 811) had already used this combination for the species now called *Campanularia volubilis* (e.g. by Hincks, 1868). Therefore Linnaeus (1767 : 1311) later provided the new name, *S. syringa*, for the present species. The specific synonymy can be set out as follows:

Calycella syringa (Linnaeus, 1767)

Corallium omnium minima, vesiculis nunc ramosum, nunc racematim, dense dispositis [clustering polype coralline]. Ellis, 1755 : 25–26, pl. 14, figs B, b.

Sertularia volubilis Pallas, 1766 : 122; (junior homonym of *S. volubilis* Linnaeus, 1758 = *Campanularia volubilis*, e.g. sensu Hincks, 1868).

Sertularia syringa Linnaeus, 1767 : 1311; (nom. nov. for *S. volubilis* Pallas, 1766, not *S. volubilis* Linnaeus, 1758).

Calycella syringa: Allman, 1864 : 375; Hincks, 1868 : 206–207, pl. 39, fig. 2.

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On the identity of the spider *Emertonius exasperans* Peckham & Peckham (Araneae : Salticidae)

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Introduction

The little known genus *Emertonius* Peckham & Peckham 1892 was formerly comprised of two species: *Emertonius exasperans* Peckham & Peckham, the type-species from Java and *E. rufescens* Simon from Madagascar. Both species were known only from females that were characterized by the 'curiously' shaped carapace. *E. rufescens*, now known from both sexes, is considered to belong to the genus *Myrmarachne* Macleay and is described elsewhere (Wanless, 1978). The discovery of a male from the Philippines, believed to be conspecific with *E. exasperans*, shows that this is also a species of *Myrmarachne* and that the genus *Emertonius* is not valid.

In the following redescription of *E. exasperans* the format and abbreviations are those given by Wanless (1978).

Myrmarachne exasperans (Peckham & Peckham) comb. nov.

(Figs 1, 2)

Emertonius exasperans Peckham & Peckham, 1892 : 54, pl. IV, figs 8, 8a, 8b, ♀ not ♂. Female LECTOTYPE (here designated) Java, Bantam (MCZ, Harvard) Examined. Simon, 1901 : 498, 499, 503, 504, fig. 5951. Roewer, 1954 : 939. Bonnet, 1956 : 1653. Prószyński, 1971 : 400.

DIAGNOSIS. *M. exasperans* is a distinctive species and the form of the carapace (Figs 1A, F; 2A, E) is diagnostic.

MALE (formerly undescribed). *Carapace* (Fig. 1A, F): punctured-reticulate with piliferous papillae; dark reddish brown; clothed with white hairs forming lateral and submarginal bands on the sides. *Eyes*: anteriors subcontiguous with apices procurved in frontal view, fringed with white hairs. *Clypeus*: white haired. *Chelicerae* (Fig. 1A, D): rugulose with furrows; orange-brown with brown-black lateral keels and with a distal violet sheen under some lights; fang apophysis lacking. *Maxillae and labium*: yellow-brown. *Sternum*: (Fig. 1C) yellow-brown. *Abdomen*: mottled pale yellow and black; scuta dark orange-brown tinged with blackish, sparsely clothed with fine dark orange hairs and margined with distinctive white haired fringes. *Legs*: femora I slightly enlarged. Light yellow-brown but tibiae I and femora I orange-brown. Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2–2, patellae 1. *Palp* (Fig. 1B, E): tibial apophysis with proximal ventral flange; seminal reservoir doubled, probably as a result of folding within the tegulum.

Dimensions: total length 5·0 mm, carapace length 2·4 mm. *Ratios*: AM : AL : PM : PL :: 12 : 7 : 1·4 : 7·5; AL–PM–PL: 9–7; width of eye row I/ carapace width at that point 1·06, width of eye row III/ carapace width at that point 1·08, quadrangle length/ carapace length 0·48, cheliceral length/ carapace length 0·90, tibia + patella IV/ carapace length 0·88 (based on 1 ♂).

FEMALE (Fig. 2A, E). *Carapace*: covered with piliferous papillae but grading to rugulose behind anterior eyes; dark reddish orange; a longitudinal white haired band on the head and fore part of thorax with white haired lateral bands and a tuft of brownish hairs on the 'hump'. *Eyes*: more or less as in ♂. *Clypeus*: white haired. *Chelicerae*: reddish orange, shiny, with 6 promarginal and 8–10 retromarginal teeth. *Maxillae and labium*: orange-brown. *Sternum* (Fig. 2B): pale yellow-brown. *Abdomen*: yellow-brown with dark brown dorsal pattern; light parts clothed with pale yellowish hairs with scanty covering of long and short orange-brown hairs in dark areas. *Legs*: legs I light yellowish with brownish streaks on outside of tibiae and patellae. Other legs light yellowish but legs IV with brownish streaks on outside of tibiae, patellae, femora and trochanters.

Bull. Br. Mus. nat. Hist. (Zool.) **33** (4): 231–296 Issued 27 April 1978

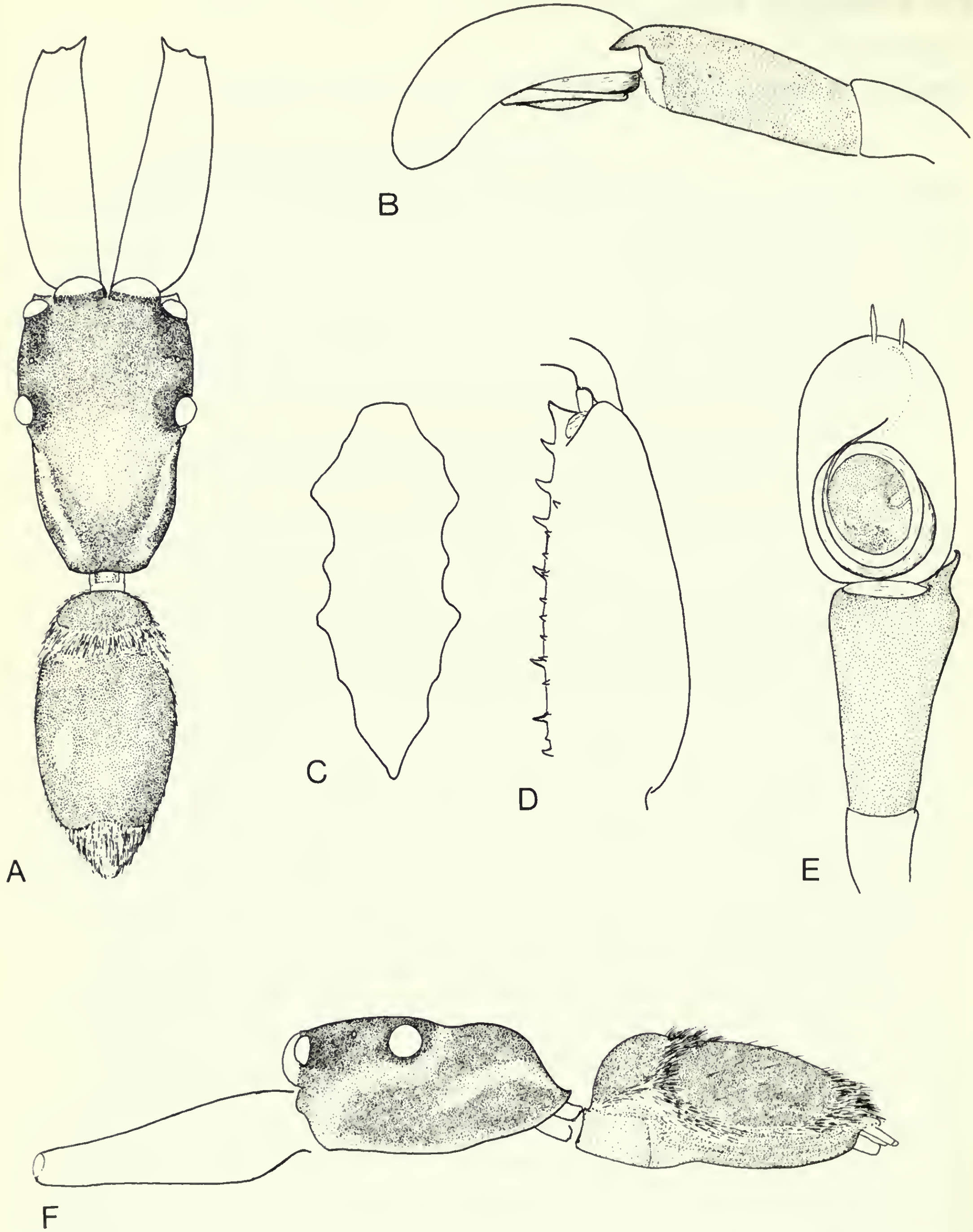

Fig. 1 *Myrmarachne exasperans* (Peckham & Peckham), ♂: (A) dorsal view; (B) palp, lateral view; (C) sternum; (D) chelicera, ventral view; (E) palp, ventral view; (F) lateral view.

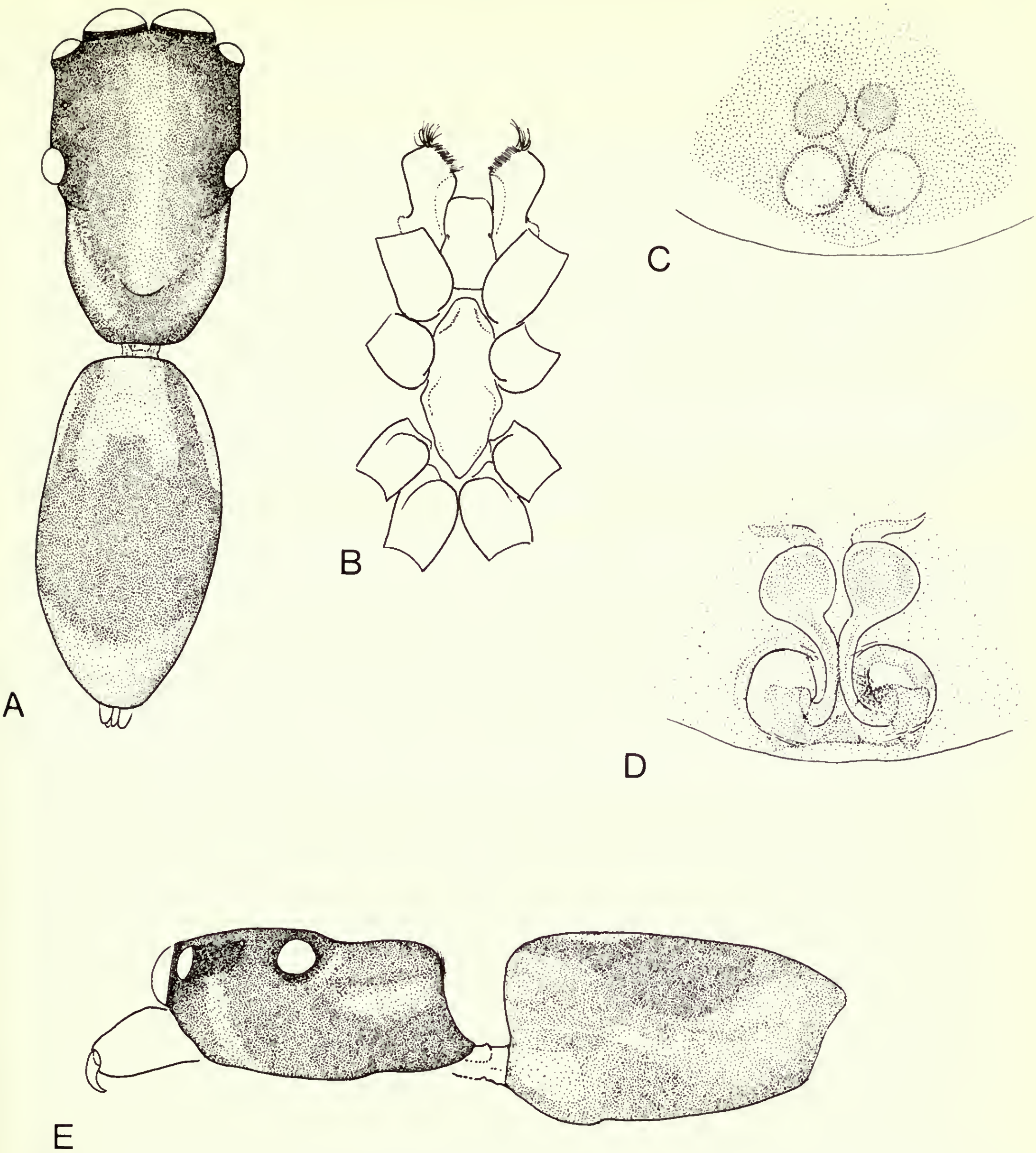

Fig. 2 *Myrmarachne exasperans* (Peckham & Peckham), ♀: (A) dorsal view; (B) sternum, coxae, maxillae and labium; (C) epigyne; (D) vulva, ventral view; (E) lateral view.

Ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2, patellae 0; retroventral spines the strongest. *Epigyne* (Fig. 2C, D): median pouch poorly defined; openings circular; spermathecae rounded and simple; distal seminal ducts broad, poorly defined.

Dimensions: total length 5·2 mm, carapace length 2·4 mm. *Ratios*: AM : AL : PM : PL :: 13 : 8 : 2 : 8; AL–PM–PL: 8–7; width of eye row I/ carapace width at that point 1·06, width of eye row III/ carapace width at that point 1·05, quadrangle length/ carapace length 0·49, tibia + patella IV/ carapace length 0·93 (based on 2 ♀).

BIOLOGY. Unknown.

DISTRIBUTION. Java, Philippines.

MATERIAL EXAMINED. Lectotype ♀, data given in synonymy. JAVA: Mt Tenggu, 1 ♀ (MNHN, Paris). PHILIPPINES: Palawan Manialingajan Pinigisan, 600 M, 12.viii.1961, 1 ♂, Noona Dan Exp. 1961–62 (BMNH).

REMARKS. The structure of the genitalia and the horizontal chelicerae of the male shows that *E. exasperans* belongs to *Myrmarachne* but the male abdominal fringes are not typical of the genus. Unfortunately, Oriental species of *Myrmarachne* are poorly known and the affinities of this species are uncertain. It resembles *E. rufescens* in body form but there are differences in the genitalia and it cannot be readily placed into any of the Ethiopian species groups proposed by Wanless (1978).

Acknowledgements

I wish to thank Dr H. W. Levi (MCZ, Harvard) and M M. Hubert (MNHN, Paris) for the loan of specimens.

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A revision of the spider genus *Bocus* Simon (Araneae : Salticidae)

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Introduction

The genus *Bocus* Peckham & Peckham, 1892 is known only from the Philippines and is represented by the type-species *Bocus excelsus* Peckham & Peckham and *B. philippinensis* sp. n. *B. flavus* Simon, known from the lectotype male and one female, is here regarded as a small pale coloured form of *B. excelsus*.

Bocus species are ant-like in body form and closely resemble *Myrmarachne* Macleay but the structure of the epigyne and the development of the intercoxal plates (cp) and sternum (Fig. 3C, D) suggest that *Bocus* is a good monophyletic genus. However, its affinities are uncertain as other ant-like genera in the Oriental region have yet to be revised.

Genus *BOCUS* Peckham & Peckham

Bocus Peckham & Peckham, 1892 : 38. Type-species *Bocus excelsus* Peckham & Peckham, by monotypy. Simon, 1901 : 501, 503, 505. Roewer, 1954 : 939. Bonnet, 1955 : 892.

Definition. Ant-like spiders ranging from about 5·5 to 11·5 mm in length. Males sexually dimorphic. Colour markings subdued; not hirsute. *Carapace*: elongate with postocular constriction emphasized by scanty white haired bands and with one pair of trichobothria dorsally; sculpturing usually papillate; fovea lacking. *Eyes*: anterior row subcontiguous with apices procurved in frontal view; middle row more or less midway between anterior lateral and posterior lateral eyes; posterior row slightly wider or slightly narrower than anterior row; quadrangle length between 27 and 33 per cent of carapace length. *Clypeus*: very low. *Female chelicerae*: normal with 3 promarginal and 4 or 6 retromarginal teeth. *Male chelicerae*: strongly developed, elongate and more or less horizontal; spurs absent; fang slightly sinuous, apophysis lacking; teeth numerous. *Maxillae*: elongate, blades more or less rounded; subparallel. *Labium*: elongate, median keel lacking. *Sternum*: long and narrow or anteriorly modified by fusion with intercoxal plates II (Fig. 3D). *Pedicel*: elongate, anterior segments slightly longer than posterior one. *Abdomen*: elongate ovoid, constricted at anterior third; scuta present in males, lacking in females; spinnerets compact, subequal in length, anteriors more robust; tracheal spiracle a transverse slit just in front of anterior spinnerets; position of colulus not evident (in specimens at hand). *Legs*: slender, tarsi I sometimes slightly compressed laterally; formula 4132; spination: dorsal and lateral spines absent; ventral spines present on legs I–II, lacking on legs III–IV; claw tufts present, apparently scanty on legs I; scopula lacking. *Female palp*: palette shaped, fringed with fine preening setae. *Male palp* (Fig. 3A, B, E, F): tibial apophysis not hooked, base sometimes forming a slight flange; embolus long, moderately slender, with two turns around tegulum; tegulum subcircular with large seminal reservoir, pars pendula present; conductor and median apophysis absent; proximal ectal margin of cymbium unmodified. *Epigyne* (Fig. 1F, G): comparatively simple with indistinct openings separated by a septum; median pouch present; primary and secondary spermathecae simple, connected by distinct seminal ducts.

The structure of the epigyne although simple is not entirely understood as there is no obvious route for spermatozoa to reach the spermathecae. The opening for the reception of the embolus and the ducts leading to the spermathecae are not evident.

Diagnosis. *Bocus* may be separated from other Oriental ant-like Salticidae by the form of the sternum (Fig. 3D) or the presence of well-developed intercoxal plates I and II (Fig. 3C).

Bull. Br. Mus. nat. Hist. (Zool.) **33** (4): 231–296

Issued 27 April 1978

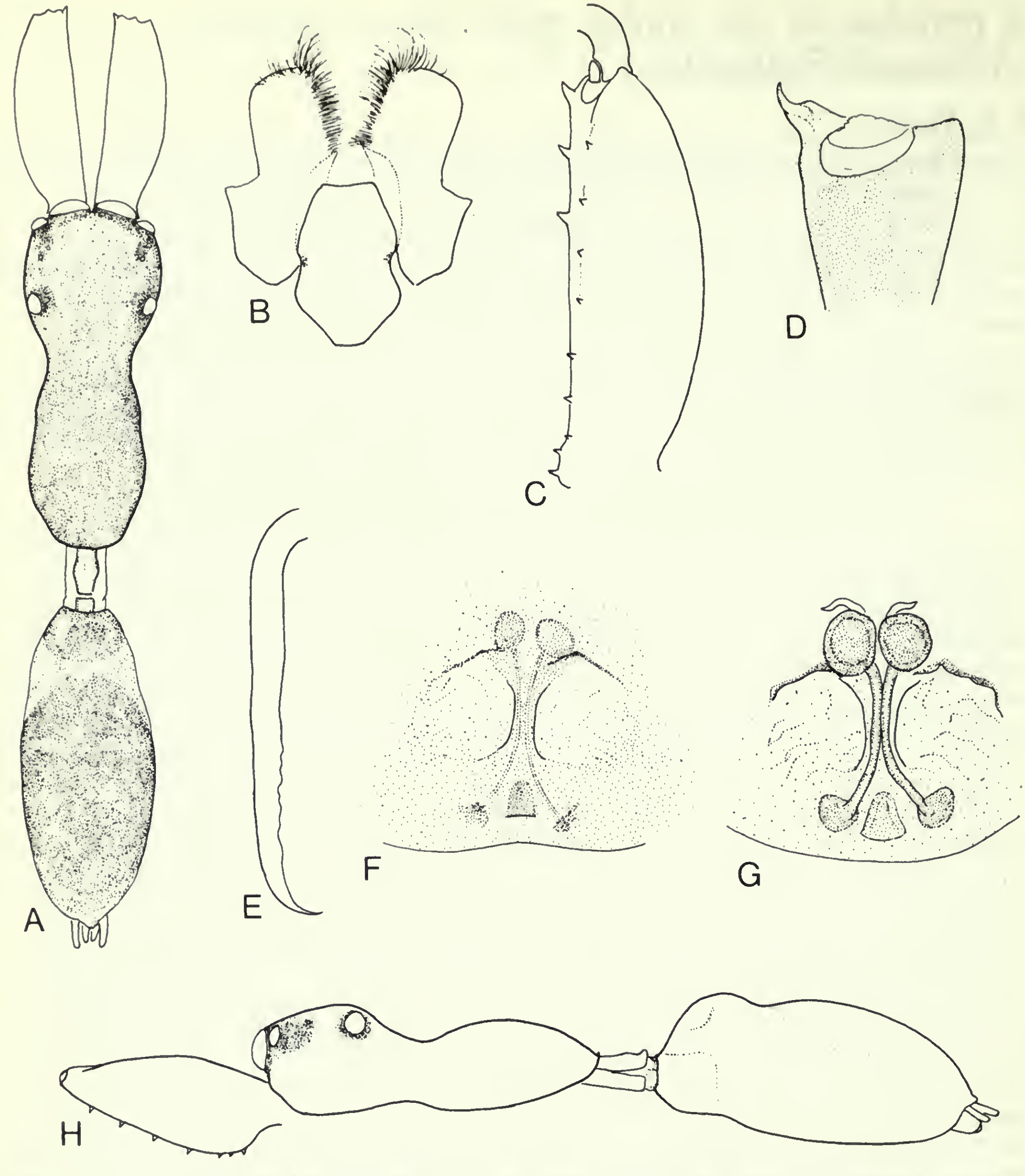

Fig. 1 *Bocus excelsus* Peckham & Peckham. Lectotype ♂: (A) dorsal view; (C) chelicera, ventral view; (E) fang; (H) lateral view. ♂ from Manila: (B) maxillae; (D) palpal tibia, ventral view. ♀ from Manila: (F) epigyne; (G) vulva, ventral view.

Bocus excelsus **Peckham & Peckham**

(Figs 1A–H; 3A, B, D)

Bocus excelsus Peckham & Peckham, 1892 : 39, pl. 3, figs 4, 4a–d, ♂. LECTOTYPE ♂ (here designated) Philippines, Luzon (MCZ, Harvard) [Examined]. Simon, 1901 : 499, 503, 505, figs 598, 599. Roewer, 1954 : 939. Bonnet, 1955 : 892.

Bocus flavus Simon, 1900 : 406, ♂. LECTOTYPE ♂ (here designated) Philippines, Manila (MNHN, Paris) [Examined]. Simon, 1901 : 503, 505. Roewer, 1954 : 939, Bonnet, 1955 : 892. **Syn. n.**

DIAGNOSIS. *B. excelsus* is readily distinguished from *B. philippinensis* sp. n. by the form of the sternum (Fig. 3D).

MALE LECTOTYPE. *Carapace* (Fig. 1A, H): finely punctured-reticulate with moderately dense papillae in eye region; thoracic part irregularly and coarsely papillate; dark reddish orange with fine scattered white hairs. *Eyes*: fringed with white hairs. *Clypeus*: fringed with whitish hairs. *Chelicerae* (Fig. 1C, E): rugulose with furrows; reddish orange grading to orange distally. *Maxillae and labium*: dark orange-brown but inner margins of maxillae and labial tip paler. *Sternum* (Fig. 3D): reddish orange. *Abdomen*: mottled dull yellow-brown and blackish with dark reddish orange scuta. *Legs*: generally orange-brown but tarsi II–IV and coxae I yellow-brown; tarsi I laterally compressed and with scanty claw tufts when compared with those of legs II–IV; ventral spination of legs I: metatarsi 2–2; tibiae 2–2–2–2–2–2–2, patellae 1. *Palp* (Figs 1D; 3A, B).

Dimensions (based on 3 ♂♂): total length 5·4–9·6 mm; carapace length 2·7–4·7 mm. *Ratios*: AM : AL : PM : PL :: 11 : 6 : 1·5 : 6; AL–PM–PL: 7–9; width of eye row I/ carapace width at that point 0·98–1·04; width of eye row III/ carapace width at that point 0·98–1·03; quadrangle length/ carapace length 0·27–0·33; chelicerae length/ carapace length 0·33–0·68; tibia plus patella IV/ carapace length 0·82–0·88.

FEMALE (labelled *B. flavus* by Simon). *Carapace*: shape as in ♂; sculpturing poorly defined, apparently finely reticulate in eye region and densely papillate on thoracic part; yellowish orange with yellow guanin in eye region, shiny; thinly clothed with short fine whitish and pale orange hairs and with scanty white haired bands in constriction. *Eyes*: as in ♂. *Clypeus*: as in ♂. *Chelicerae*: yellow-brown with 3 promarginal and 4 or 6 retromarginal teeth. *Maxillae*: light yellow-brown. *Labium*: light yellow-brown with whitish grey tip. *Sternum*: shape as in ♂; pale yellowish orange, shiny. *Abdomen*: light greyish brown with a vague series of transverse bands posteriorly; spinnerets pale yellowish. *Legs*: generally light yellow-brown with vague lateral streaks on legs I; ventral spination: metatarsi 2–1–2; tibiae as in ♂; patellae 0. *Palp*: pale yellow, shiny. *Epigyne* (Fig. 1F, G).

Dimensions (based on 1 ♀): total length 5·6 mm; carapace length 2·6 mm. *Ratios*: AM : AL : PM : PL :: 9: 4·5 : 1 : 5; AL–PM–PL: 5·5–6; width of eye row I/ carapace width at that point 1·03; width of eye row III/ carapace width at that point 1·05; quadrangle length/ carapace length 0·33; tibia plus patella IV/ carapace length 0·78.

VARIATION. *B. excelsus* varies considerably in size with the eye positions and chelicerae showing allometric growth; a trend found to be widespread in *Myrmarachne* from the Ethiopian region (Wanless, 1978). The pale coloured forms (i.e. 1 ♀ and lectotype ♂ of *B. flavus*) may have been freshly moulted when collected or have faded during preservation. Moreover, experience has shown that guanin in the eye region (see female description above) is an unreliable character in colour pattern formation, and in this instance it could be an artifact but additional specimens are required to show if this interpretation is correct.

BIOLOGY. Unknown.

DISTRIBUTION. Philippines.

MATERIAL EXAMINED. Type-data given in synonymy. PHILIPPINES, Manila, 1 ♂ (*J. Walker*) (BMNH); Manila, 1 ♀ (MNHN, Paris).

Bocus philippinensis sp. n.

(Figs 2A–D; 3C, E, F)

DIAGNOSIS. *B. philippinensis* is readily distinguished from *B. excelsus* Peckham & Peckham by the form of the sternum (Fig. 3D).

FEMALE. Unknown.

MALE HOLOTYPE. *Carapace* (Fig. 3A, D): finely punctured-reticulate with moderately dense papillae in eye region; thoracic part irregularly and coarsely papillate; brown-black with light orange mid-dorsal patch in constriction; clothed with short whitish hairs with scanty white

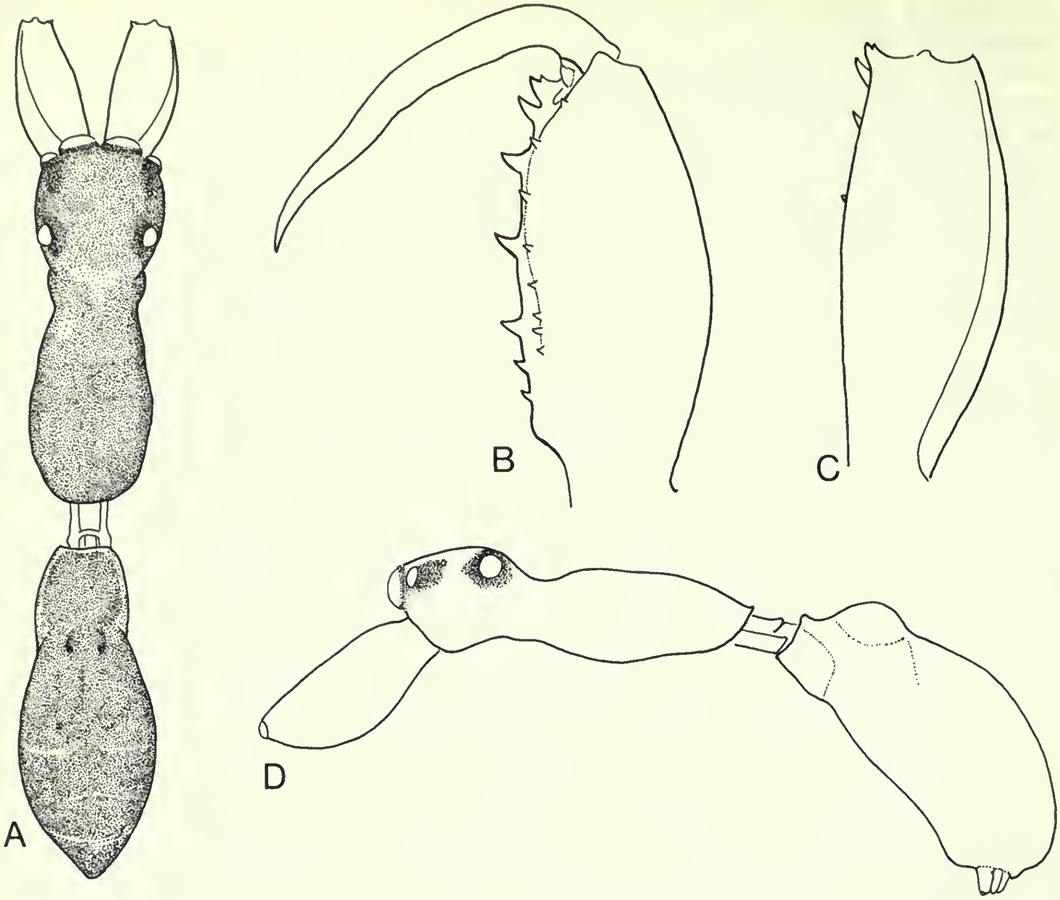

Fig. 2 *Bocus philippinensis* sp. n., holotype ♂: (A) dorsal view; (B) chelicera, ventral view; (C) chelicera, dorsal view; (D) lateral view.

haired bands in constriction and on lower margins of cephalic part. *Eyes*: fringed with whitish hairs. *Clypeus*: fringed with long white hairs. *Chelicerae* (Fig. 2B, C): papillate with furrows; dark reddish orange. *Maxillae and labium*: dark reddish orange. *Sternum* (Fig. 3C): dark reddish orange. *Abdomen*: light yellowish with blackish mottling; scuta dark reddish orange with four impressed spots; clothed with fine whitish pubescence forming a poorly defined series of transverse bands; ventre light greyish yellow with blackish mottling and a weak scutum from epigastric furrow to spinnerets. *Legs*: legs I dark orange-brown and coxae light yellowish; other legs dark orange-brown grading to light orange distally with light yellowish patches on ventre of trochanters IV; tarsi I slightly compressed laterally with scanty claw tufts; ventral spination of legs I: metatarsi 2–2, tibiae 2–2–2–2–2–2, patellae 2. *Palp* (Fig. 3E, F).

Dimensions (based on 1 ♂): total length 11·5 mm, carapace length 5·52 mm. *Ratios*: AM : AL : PM : PL :: 16 : 8 : 2 : 10; AL–PM–PL: 11–11·5; width of eye row I/ carapace width at that point 1·02; width of eye row III/ carapace width at that point 1·03; quadrangle length/ carapace length 0·28; chelicerae length/ carapace length 0·50; tibia plus patella IV/ carapace length 0·89.

VARIATION. Unknown.

BIOLOGY. Unknown.

DISTRIBUTION. Philippines.

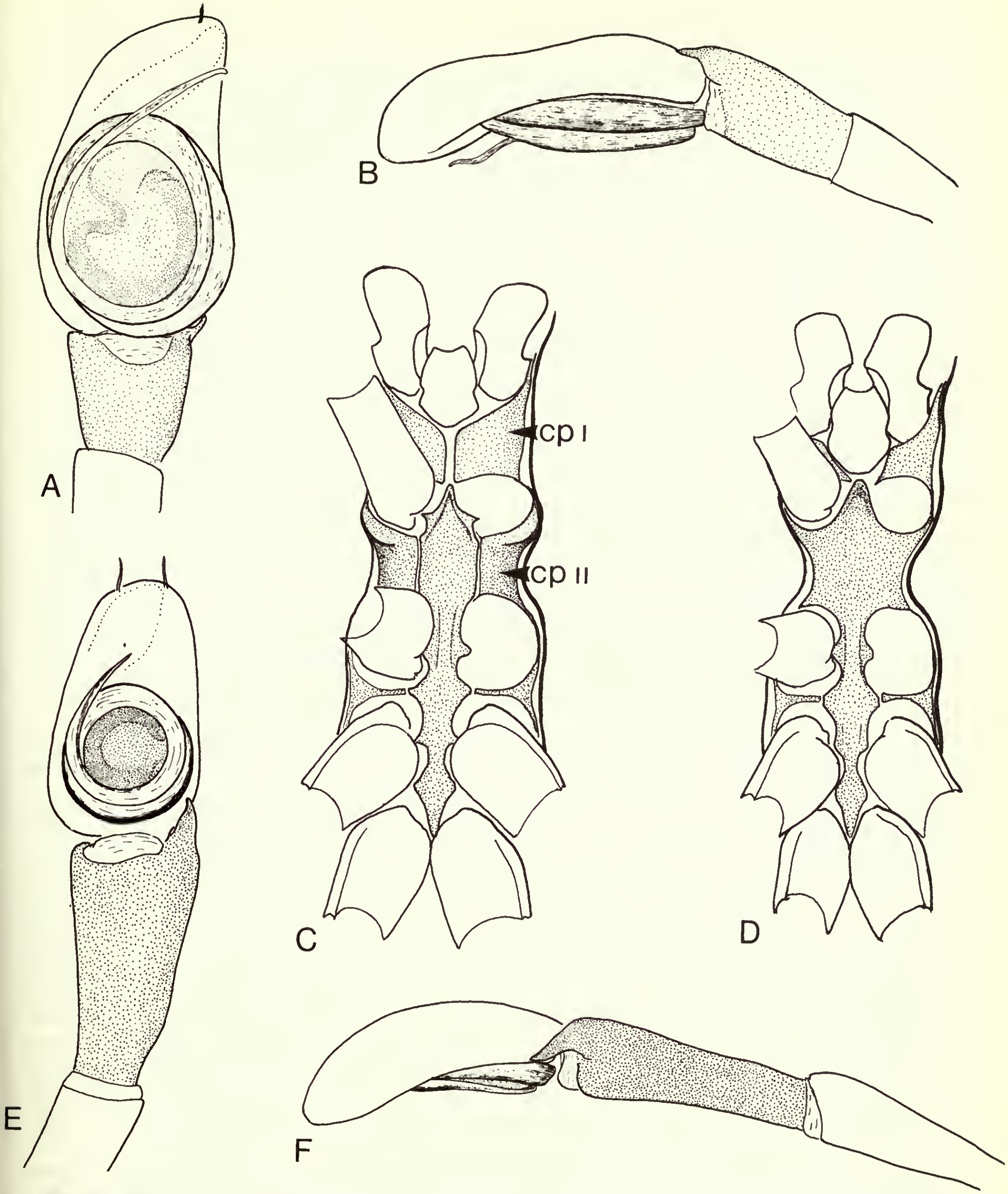

Fig. 3 *Bocus excelsus* Peckham & Peckham, lectotype ♂: (A) palp, ventral view; (B) palp, lateral view; (D) sternum. *Bocus philippinensis* sp. n., holotype ♂: (C) sternum; (E) palp, ventral view; (F) palp, lateral view.

MATERIAL EXAMINED. Holotype ♂, PHILIPPINES, Palawan, Mantalingajan, Pinigisan, 600 m, 12.ix.1961 (Noona Dan Exp. 1961–62) (BMNH reg. no. 1977.4.21.24).

REMARKS. The derivation of the form of the sternum in *B. excelsus* would not have been appreciated but for the discovery of *B. philippinensis*, the form of whose sternum may well be ancestral to the type found in *B. excelsus*. The development of an elongate carapace is not unusual in ant-like spiders but the evolution of well-developed intercoxal plates and their fusion with the sternum to compensate for increased carapace length has not to my knowledge previously been described in the Salticidae. It is unfortunate that the affinities of *Bocus* are uncertain. The structure of the palp and the body form suggest that it may have evolved from *Myrmarachne* stock and it could be placed in the subfamily Myrmarachninae. The epigyne which is characterized by the presence of secondary spermathecae resembles that of *M. exasperans* (Wanless, 1978) which has short distal seminal ducts which might, with hindsight, also be interpreted as secondary spermathecae. Secondary spermathecae are also found in the ant-like genera *Belippo* Simon and *Sarinda* Peckham & Peckham, but these genera are in other respects not closely related to *Bocus*. It would be premature at the present time to speculate too widely on the affinities of *Bocus* until structural trends in the genitalia of Oriental and even Australian *Myrmarachne* are known.

Acknowledgements

I wish to thank Dr H. W. Levi (MCZ, Harvard) and M M. Hubert (MNHN, Paris) for the loan of specimens.

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A revision of the spider genus *Sobasina* (Araneae : Salticidae)

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Introduction

The genus *Sobasina* Simon, 1897 was formerly known only from a single specimen of the type-species *Sobasina amoenula* Simon from the Santa Cruz Islands in the southwest Pacific Ocean. Several new localities reported by Berland (1938) from the New Hebrides are not accepted here as all of his specimens have been misidentified. In this present paper the genus is redefined and five new species are described.

The measurements were made in the manner described by Wanless (1977/8), but for the leg spination, the system adopted is that used by Platnick & Shadab (1975).

Sobasina is comprised of small ant-like spiders whose distribution appears to be restricted to the chain of Pacific Islands extending from the Bismarck Archipelago in the north to the New Hebrides in the south. The genus is not represented in the New Guinea or New Caledonia collections of the British Museum (Natural History). The distribution pattern (Fig. 1) suggests that allopatric speciation may have occurred as some islands have endemic species; however, there are very few records and no firm conclusions can be reached at the present time.

The species are evidently all closely related and appear to form a good monophyletic genus. Most species can be readily distinguished by the form of the carapace, sculpturing, and the presence or absence of ventral tibial fringes on legs I. The genitalia are less useful in this respect as they are small, pale and rather similar. The biology is unknown but two species have been found in litter and the small size of the others suggests that they too may also live in litter, a habitat often overlooked by the early collectors.

Genus *SOBASINA* Simon

Sobasina Simon, 1897 : 275. Type-species *Sobasina amoenula* Simon, by monotypy. Simon 1901 : 512, 513. Petrunkevitch, 1928 : 183. Roewer, 1954 : 957. Bonnet, 1958 : 4090.

DEFINITION. Ant-like spiders ranging from about 2·5 to 3·8 mm in length. Sexes alike in general body form but males sometimes with dorsal and ventral abdominal scuta. Colour markings subdued; not hirsute but carapace usually with marginal white haired patch above coxae I. *Carapace*: shape variable; sculpturing variable, usually a combination of papillae and punctures (Pl. 1a, b, d, e); fovea lacking. *Eyes*: anterior row contiguous with apices strongly recurved; middle row about midway between anterior lateral and posterior lateral eyes or sometimes nearer to anterior laterals; posterior row wider than anterior row; quadrangle length between 49 and 57 per cent of carapace length. *Clypeus*: low, more or less vertical. *Chelicerae*: small to medium; more or less subvertical; promargin with 2 teeth, retromargin with a biscuspid tooth (i.e. in chelicerae examined which do not include all species described here). *Maxillae*: parallel or slightly convergent. *Labium*: subtriangular. *Sternum*: elongate scutiform with scalloped margins. *Pedicel*: long rather stalk-like; anterior dorsal and ventral segments well developed, posterior segment vestigial (Pl. 1c). *Abdomen*: shape variable; constriction and/or scuta sometimes present; spinnerets subequal in length, arranged in two rows, posteriors and medians slender and dorsal to robust anteriors; trachea branched, arising from transverse slit just in front of spinnerets (Fig. 4F); colulus represented by two minute setae. *Legs*: slender but coxae and trochanters I elongate; femora I dorsoventrally enlarged and slightly compressed laterally with tibiae I sometimes slightly enlarged and fringed below with stiff hairs; formula 1432 or 1423; spination: dorsal and lateral

Bull. Br. Mus. nat. Hist. (Zool.) **33** (4): 231–296 Issued 27 April 1978

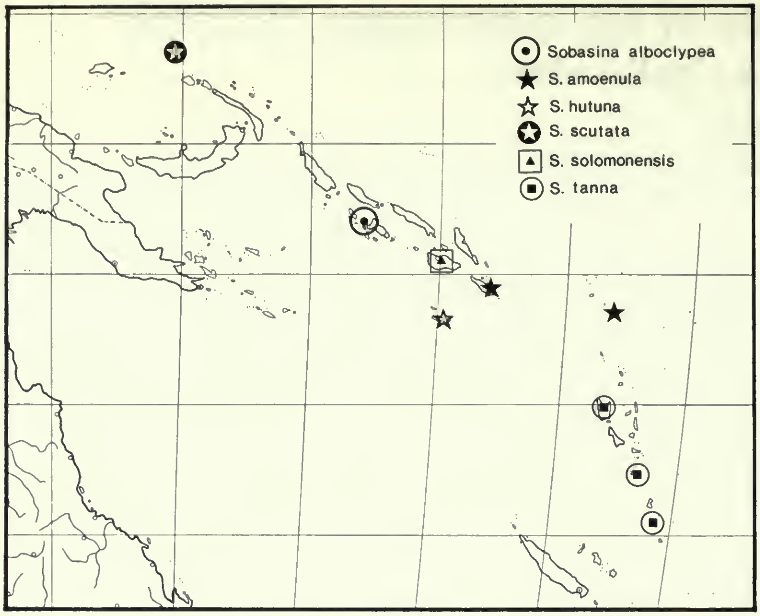

Fig. 1 Distribution of *Sobasina alboclypea* sp. n., *S. amoenula* Simon, *S. hutuna* sp. n., *S. scutata* sp. n., *S. solomonensis* sp. n. and *S. tanna* sp. n.

spines lacking, ventral spines present on metatarsi I–II and tibiae I–II but absent on legs III–IV; claw tufts present, scopula lacking. *Female palp*: general form as in Fig. 2D, G; fringed with preening setae. *Male palp* (Fig. 4A, G): tibial apophysis slender; embolus very short and slender; tegulum with large seminal reservoir; pars pendula, conductor and median apophysis lacking; proximal ectal margin of cymbium sometimes slightly protuberant. *Epigyne* (Fig. 5A–F): openings very indistinct, leading to wide flask-shaped ducts that open into more slender ducts which terminate as spermathecae.

Simon (1901) made *Sobasina* the nominate genus of the suprageneric group Sobasineae, and included two other ant-like genera, *Fluda* Peckham & Peckham and *Keyserlingella* Peckham & Peckham, from the Neotropical region. *Fluda*, a senior synonym of *Keyserlingella* (Galiano, 1971), does not appear to be closely related to *Sobasina*. The elongate coxae and trochanters of legs I suggest that the affinities of *Sobasina* may lie with the Oriental Diolenieae but on the other hand the form of the carapace, sometimes narrowed posteriorly (presumably to increase the apparent length of the pedicel), indicates affinities with the Neotropical genus *Synemosyna*. However, the genitalia of *Synemosyna* (Galiano, 1966) are quite different from those of *Sobasina* and similarities in the form of the carapace are probably the result of convergence. Unfortunately, genital structures in the Diolenieae are poorly known and *Sobasina* must therefore retain its somewhat isolated position until additional genera have been revised.

DIAGNOSIS. *Sobasina* is distinguished from other Oriental ant-like Salticidae by the structure of the genitalia, the strongly recurved (in frontal view) anterior row of eyes, the scalloped sternum and the elongate coxae and trochanters of legs I.

List of species in the genus *Sobasina* Simon, 1897

Sobasina alboclypea sp. n.
S. amoenula Simon, 1897
S. hutuna sp. n.
S. scutata sp. n.
S. solomonensis sp. n.
S. tanna sp. n.

Key to species of *SOBASINA*

1 Tibiae I with ventral fringes (Fig. 4B) 2
– Tibiae I without ventral fringes (Fig. 2F) 4
2 Eye region finely rugulose anteriorly to papillate posteriorly; thoracic sides papillate ***hutuna*** sp. n. (p. 253)
– Eye region papillate; thoracic sides irregularly punctured 3
3 Thoracic 'hump' high (Fig. 3C, D); thoracic punctures very numerous . ***tanna*** sp. n. (p. 251)
– Thoracic 'hump' low (Fig. 3B); thoracic punctures less numerous (Pl. 1e) ***solomonensis*** sp. n. (p. 248)
4 Eye region finely rugulose anteriorly to papillate posteriorly . . ***amoenula*** Simon (p. 247)
– Eye region entirely papillate 5
5 Thoracic sides punctured; abdomen with dorsal and ventral scuta . ***scutata*** sp. n. (p. 253)
– Thoracic sides punctured in postocular region to papillate elsewhere; abdominal scuta lacking ***alboclypea*** sp. n. (p. 254)

Sobasina amoenula Simon

(Fig. 2A–H)

Sobasina amoenula Simon, 1897 : 276, ♀. LECTOTYPE ♀ (here designated) Santa Cruz Islands, Vanikoro Island (MNHN, Paris) [Examined]. Simon, 1901 : 512, 513, 515, figs 613–615. Roewer, 1954 : 957. Bonnet, 1958 : 4090. Prószyński, 1971 : 475.
[*S. amoenula:* Berland, 1938 : 151, fig. 56. Misidentification]

Berland (1938) records two males and two females of *S. amoenula* Simon, from various localities in the New Hebrides. The female from Erromango is a juvenile *Myrmarachne* and the male from Malekula belongs in the genus *Efate*. The specimen from Tanna Island is male and not female as indicated; it agrees very well with the figures presented by Berland (p. 151, fig. 56) and is conspecific with the male from Efate Island. They are very similar in general appearance to *S. amoenula* but they are not conspecific and represent a new taxon described elsewhere in this paper (p. 251).

DIAGNOSIS. *S. amoenula* is closely related to *S. solomonensis* sp. n. and *S. tanna* sp. n., but may be distinguished by the absence of ventral fringes on legs I.

MALE. Unknown.

FEMALE LECTOTYPE. *Carapace* (Fig. 2A, C): eye region finely rugulose anteriorly to papillate posteriorly; thoracic part smooth dorsally to papillate laterally but with irregular punctures in lower part of postocular region; orange to light orange with scattered long white hairs and with a white haired patch above level of coxae I. *Eyes*: with black surrounds, anteriors fringed with white hairs. *Clypeus*: orange with blackish margin and with several long stiff light yellowish hairs. *Chelicerae*: light orange; promargin with 2 teeth, retromargin with a wide bicuspid tooth. *Maxillae and labium*: light orange to yellowish orange. *Sternum* (Fig. 2B): light orange, shiny. *Abdomen*: whitish yellow with blackish markings, shiny; with scanty white haired bands in constriction. *Legs*: legs I (Fig. 2F): lacking ventral tibial fringes. Generally light yellow-orange to orange but with black streaks along inside of tibiae and patellae I. Spination: tibiae: I V 4–3–1; II V 0–1–0; metatarsi: I V 2–2–2; II V 0–1–1. *Palp* (Fig. 2D, G): yellowish orange, shiny. *Epigyne* (Fig. 2E, H): small and pale.

Dimensions (mm): total length 3·28; carapace length 1·50, breadth 0·80; abdomen length 1·50; eyes anterior row 0·72; middle row 0·68, posterior row 0·82; quadrangle length 0·78. *Ratios*: AM : AL : PM : PL :: 6·5 : 3 : 1 : 4; AL–PM–PL: 5·5–7·5.

VARIATION. Female total length varies from 3·24 to 3·28 mm, carapace length 1·5–1·52 mm (three specimens). Two females from San Cristobal are regarded as being conspecific with *S. amoenula* although they are darker. The abdomens are brown-black and the legs have black streaks along the insides of the tibiae and patellae, and also on femora III–IV.

DISTRIBUTION. Santa Cruz Islands; Solomon Islands.

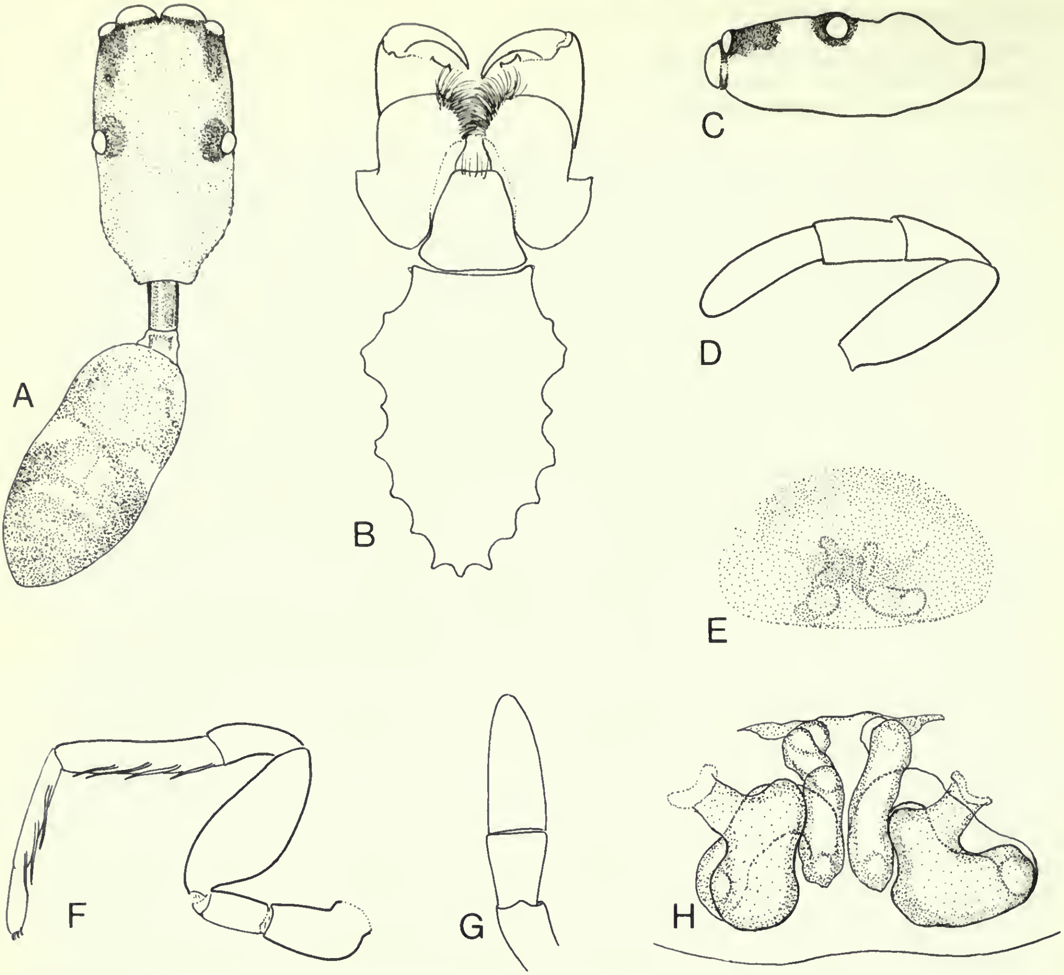

Fig. 2 *Sobasina amoenula* Simon, lectotype ♀: (A) dorsal view; (B) sternum, maxillae and labium; (C) carapace lateral view; (D) palp, lateral view; (E) epigyne; (F) leg I; (G) palp, dorsal view; (H) vulva, ventral view.

Material examined. Lectotype ♀, data given in synonymy. Solomon Islands, San Cristobal, Wainoni, in coconut litter, 2 ♀, 21.vii.1965 (*P. N. Lawrence*) Royal Society Expedition 1965 (BMNH).

Sobasina solomonensis sp. n.

(Figs 3A, B, F; 4A, D, C, F, G; 5A–C; Pl. 1a–e)

Diagnosis. *S. solomonensis* is closely related to *S. tanna* sp. n. and *S. amoenula* Simon, but may be distinguished by the following combination of characters. Legs I with ventral tibial fringes (Fig. 4C); carapace with low thoracic 'hump' (Fig. 3B) and scattered thoracic punctures (Pl. 1e).

Male holotype. *Carapace* (Fig. 3A, B): eye region papillate; thoracic part irregularly papillate dorsally with scattered punctures laterally; orange grading to blackish in anterior part of eye region; clothed with fine whitish hairs with light yellowish ones on the head. *Eyes*: with black surrounds; anteriors fringed with fine whitish hairs but with fine yellowish ones in dorsal vortex between AM. *Clypeus*: orange with several stiff white hairs. *Chelicerae*: yellowish orange, shiny; promargin with 2 teeth, retromargin with a small wide bicuspid tooth. *Maxillae and labium*: light orange. *Sternum*: light orange with darker margins, shiny. *Abdomen*: with dorsal and ventral scuta more or less as in *S. hutuna* sp. n. (Fig. 6B); yellowish orange with darker markings; clothed with fine whitish hairs and scattered light orange ones. *Legs*: legs I with ventral tibial fringes composed of stiff brownish hairs (Fig. 4C). Light orange to orange with faint sooty streaks on femora IV. Spination: tibiae: I V 3–4–2; metatarsi I V 2–2–2; II V 0–1–0. *Palp* (Fig. 4A, G): light orange.

Dimensions (mm): total length 2·4; carapace length 1·28, breadth 0·8; abdomen length 1·12; eyes anterior row 0·70, middle row 0·65, posterior row 0·80; quadrangle length 0·74. *Ratios*: AM : AL : PM : PL :: 6·5 : 4 : 1 : 4·5; AL–PM–PL: 6·5–5·5.

FEMALE. Colour and body form similar to ♂. *Carapace* (Pl. 1a, b, d, e): thorax with more distinctive smooth dorsal area and fewer papillae. *Sternum* (Fig. 4D): as in ♂. *Pedicel* (Pl. 1c): as in ♂. *Abdomen*: without scuta. *Legs*: as in ♂ but spination of tibiae II: V 0–1–0. *Epigyne* (Fig. 5A–C): small and pale, and very similar to that of *S. amoenula*.

Dimensions (mm): total length 2·92; carapace length 1·40, breadth 0·82; abdomen length 1·46; eyes anterior row 0·74, middle row 0·68, posterior row 0·84; quadrangle length 0·76. *Ratios*: AM : AL : PM : PL :: 6·5 : 4 : 0·75 : 4·3; AL–PM–PL: 6–6.

VARIATION. Total length of males varies from 1·88 to 2·60 mm, carapace length 1·24–1·38 mm (three specimens). Female total length varies from 2·52 to 2·80 mm, carapace length 1·32–1·44 mm (eight specimens).

The majority of specimens examined did not show significant variation but one pale coloured

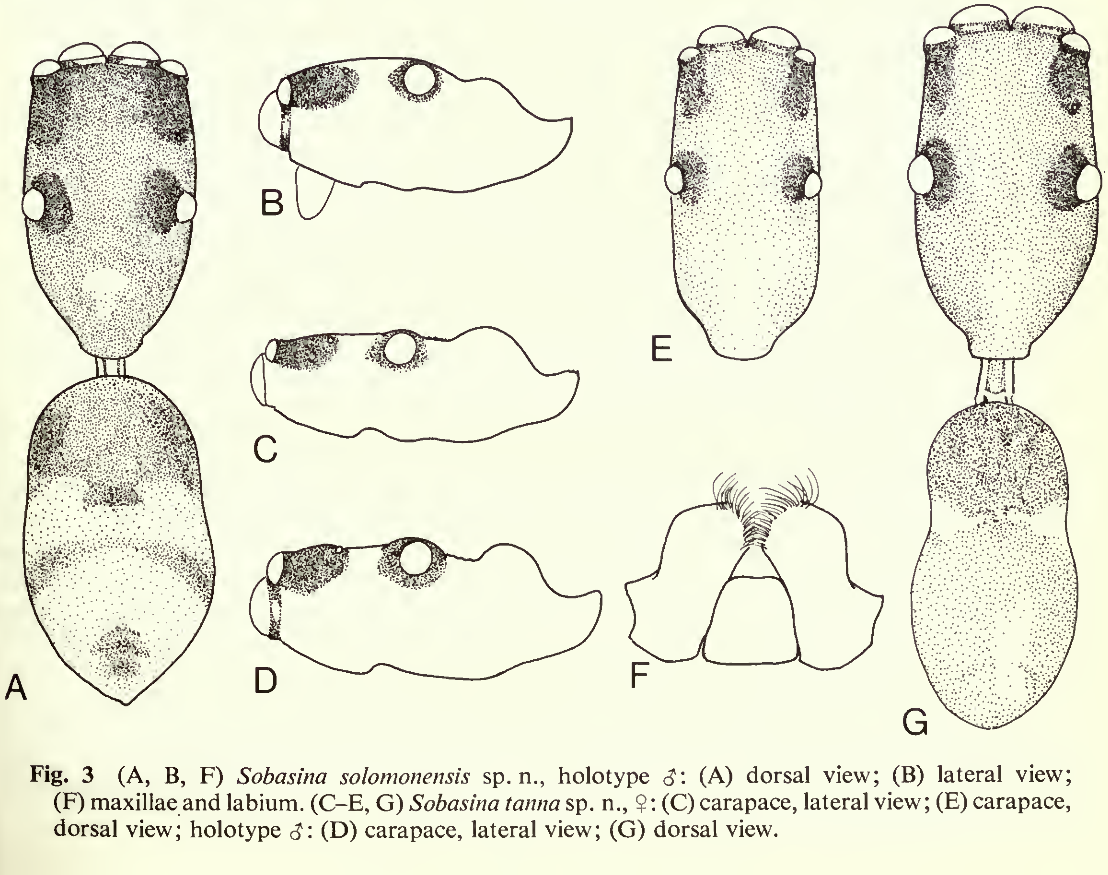

Fig. 3 (A, B, F) *Sobasina solomonensis* sp. n., holotype ♂: (A) dorsal view; (B) lateral view; (F) maxillae and labium. (C–E, G) *Sobasina tanna* sp. n., ♀: (C) carapace, lateral view; (E) carapace, dorsal view; holotype ♂: (D) carapace, lateral view; (G) dorsal view.

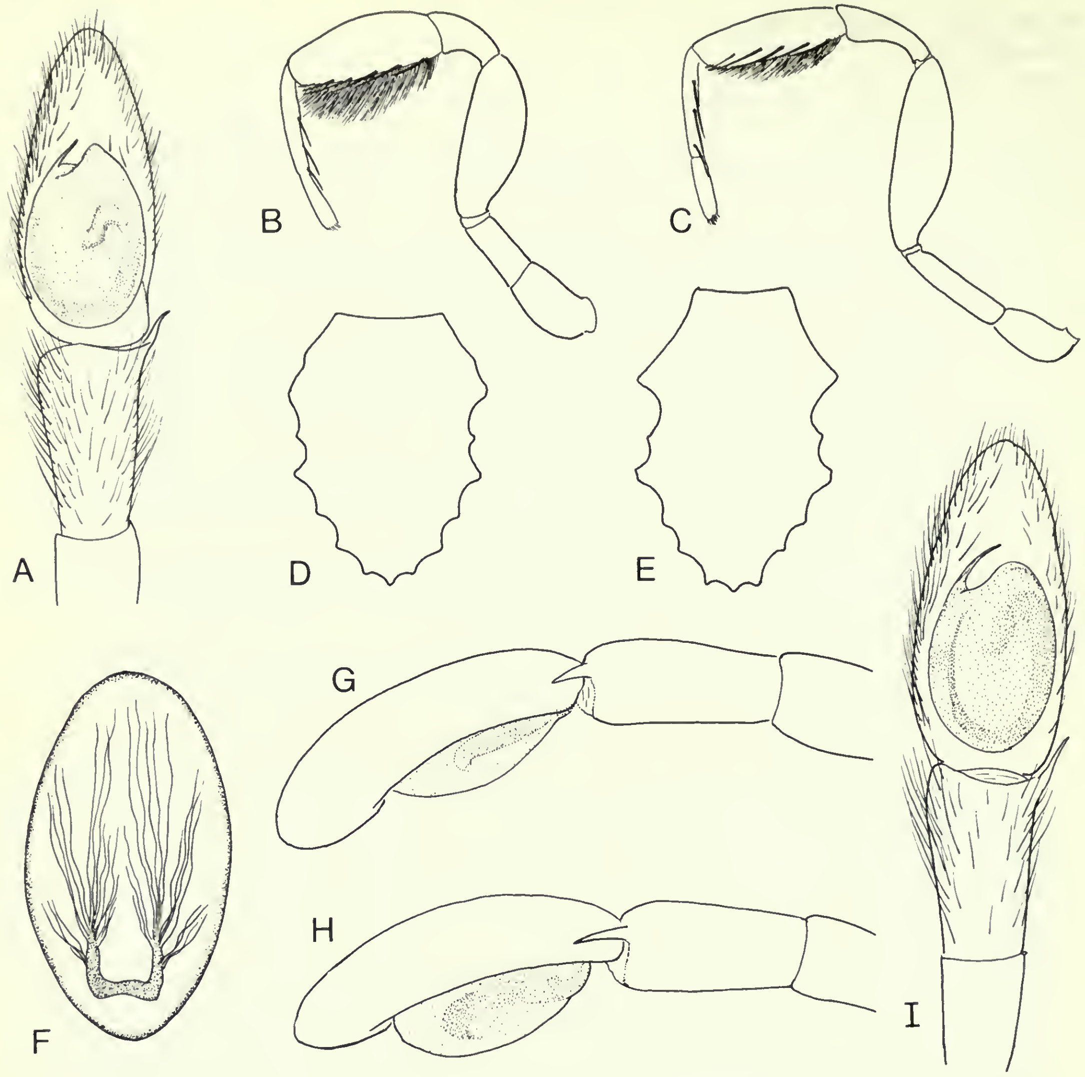

Fig. 4 (A, C, D, F, G) *Sobasina solomonensis* sp. n., holotype ♂: (A) palp, ventral view; (G) palp, lateral view; ♂: (C) leg I; ♀: (D) sternum; (F) tracheal system, schematic. (B, E, H, I) *Sobasina tanna* sp. n., holotype ♂: (B) leg I; (E) sternum; (H) palp, lateral view; (I) palp, ventral view.

male appears to lack abdominal scuta. Another specimen, a female from Guadalcanal, differs by having the carapace shiny dark mahogany and the abdomen shiny brown-black. The legs are yellowish brown except for legs I which have the femora, patellae and proximal two thirds of tibiae dark mahogany. The thorax has fewer punctures but this may not be significant as the number and arrangement of thoracic punctures is slightly variable. The specimen may represent a new closely related taxon, but additional material is necessary to reach a satisfactory conclusion.

Distribution. Solomon Islands, Guadalcanal.

Material examined. Holotype ♂, Solomon Islands, Guadalcanal, S.W. end Monitor Creek, in litter on forest root mat, 5.vii.1965 (*P. N. Lawrence*, 49–60) Royal Society Expedition 1965 (BMNH reg. no. 1977.4.21.25). Paratypes: Solomon Islands: Guadalcanal, Mt Austin, 1 ♀, ii.1961, 3 ♂♂, 8 ♀♀, ii–xii.1963 (*P. J. M. Greenslade*) (BMNH).

Sobasina tanna sp. n.

(Figs 3C–E, G; 4B, E, H, I; 5D–F)

DIAGNOSIS. *S. tanna* is closely related to *S. solomonensis* sp. n. and *S. amoenula* Simon, but may be distinguished by the following combination of characters. Tibiae I with ventral fringes (Fig. 4B), carapace with high thoracic 'hump' (Fig. 3C, D) and numerous thoracic punctures.

MALE HOLOTYPE. *Carapace* (Fig. 3D, G): eye region papillate; thoracic part smooth dorsally with numerous punctures laterally; reddish orange, thoracic 'hump' a shade lighter; rubbed but a white haired marginal patch above level of coxae I. *Eyes*: with black surrounds except AM; anteriors fringed with white hairs. *Clypeus*: fringed with long white hairs especially below AL. *Chelicerae*: orange-brown; promargin with 1 tooth, retromargin with a bicuspid tooth. *Maxillae*

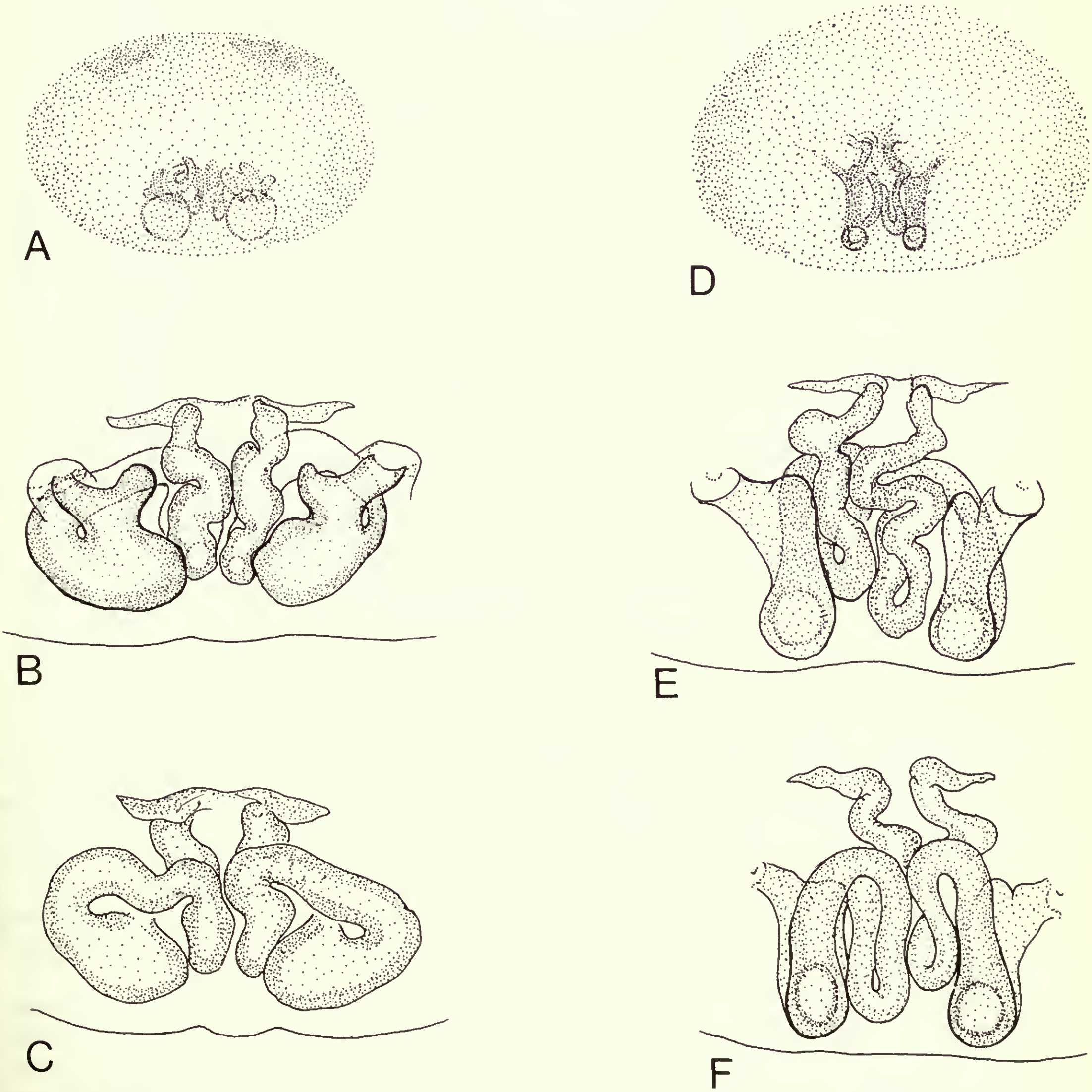

Fig. 5 (A–C) *Sobasina solomonensis* sp. n., ♀: (A) epigyne; (B) vulva, ventral view; (C) vulva, dorsal view. (D–F) *Sobasina tanna* sp. n., ♀: (D) epigyne; (E) vulva, ventral view; (F) vulva, dorsal view.

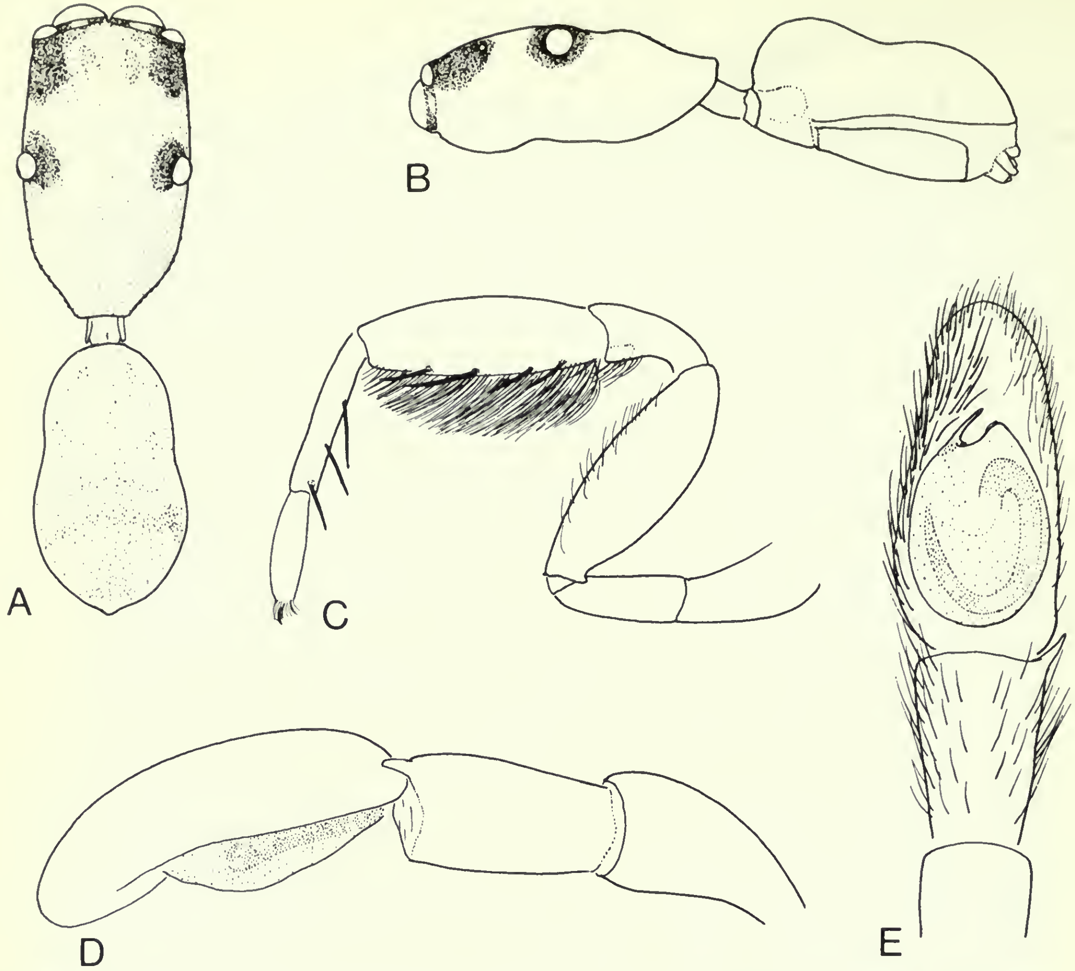

Fig. 6 *Sobasina hutuna* sp. n., holotype ♂: (A) dorsal view; (B) lateral view; (C) leg I; (D) palp, lateral view; (E) palp, ventral view.

and labium: orange-brown. *Sternum* (Fig. 4E): yellow-brown with faint blackish mottling and with broad clear orange margins, shiny. *Abdomen*: scuta not evident; slightly constricted; pale yellowish with faint blackish mottling and with yellowish bands in constriction. *Legs*: legs I with ventral tibial fringes composed of orange-brown hairs; whitish yellow to yellow. Remaining legs whitish yellow with greyish black markings around the ends of patellae III and IV. Spination: tibiae: I V 4–4–5 or 3–4–3; metatarsi: I V 0–4–2. *Palp* (Fig. 4H, I): pale yellow to whitish yellow with sooty markings.

Dimensions (mm): total length 3·24; carapace length 1·60, breadth 0·85; abdomen length 1·46; eyes anterior row 0·80, middle row 0·74, posterior row 0·92; quadrangle length 0·80. *Ratios*: AM : AL : PM : PL :: 7·5 : 4·5 : 1 : 5, AL–PM–PL: 6·5–6·2.

FEMALE ALLOTYPE. Poorly preserved but colour, sculpturing and body form very similar to ♂. *Carapace* (Fig. 3C, E): slightly narrower in dorsal view. *Legs*: as in ♂ but spination of tibiae I V 4–3–4. *Epigyne* (Fig. 5D–F): openings obscure, flask shaped ducts relatively narrow.

Dimensions (mm): total length 3·2; carapace length 1·46, breadth 0·72; abdomen length 1·48; eyes anterior row 0·66, middle row 0·62, posterior row 0·74; quadrangle length 0·72. *Ratios*: AM : AL : PM : PL :: 6·5 : 3 : 1 : 3·5, AL–PM–PL: 5·5–6.

VARIATION. A male from Efate Island measures 2·4 mm total length, 1·3 mm carapace length. The thoracic 'hump' is slightly lower than that of the holotype and resembles that of the female (Fig. 3C); it is possibly more pronounced in larger individuals. Female total length varies from 2·56 to 3·28 mm, carapace length 1·42–1·52 mm (three specimens). The females, all from Espiritu Santo Island, are slightly more slender than the holotype from Tanna Island, about 300 miles southeast of Espiritu Santo. The difference may be the result of sexual dimorphism or geographical variation. It is also possible that the females are not conspecific with the male in spite of the fact that they are very similar in other respects.

DISTRIBUTION. New Hebrides: Espiritu Santo Island; Efate Island; Tanna Island.

MATERIAL EXAMINED. Holotype ♂, NEW HEBRIDES, Tanna Island, 1930 (*L. E. Cheeseman*) (BMNH reg. no. 1932.9.12.56). Paratypes: NEW HEBRIDES: Espiritu Santo Island, Hog Harbour, 3 ♀♀, vii.1925 (*P. A. Buxton*) (BMNH); Efate Island, Port-Vila, 1 ♂, 1933 (*M. Risbec*) (MNHN, Paris).

Sobasina hutuna sp. n.

(Fig. 6A–E)

DIAGNOSIS. *S. hutuna* is readily distinguished from other species of *Sobasina* by the combination of ventral tibial fringes on legs I (Fig. 6C), abdominal scuta and thoracic papillae.

FEMALE. Unknown.

MALE HOLOTYPE. *Carapace* (Fig. 6A, B): finely rugulose in eye region to densely papillate on thoracic part; orange, shiny; sparsely clothed with whitish hairs. *Eyes*: with black surrounds; anteriors fringed with white hairs. *Clypeus*: with several stiff whitish hairs. *Chelicerae*: pale orange; teeth not examined. *Maxillae and labium*: pale orange. *Sternum*: more or less as in *S. solomonensis* sp. n., orange suffused with some black, shiny. *Abdomen*: with dorsal and ventral scuta; slightly constricted; light orange with blackish markings and with scanty white haired bands in constriction. *Legs*: legs I with ventral tibial fringes composed of grey-black hairs; light yellowish orange but tibiae, metatarsi distally and tarsi proximally orange. Remaining legs yellowish orange but with sooty lateral streaks on legs III and IV. Spination: tibiae: I V 1–4–1; II V 0–1–0; metatarsi: I V 0–2–4. *Palp* (Fig. 6D, E): light orange with yellowish cymbium, clothed with fine whitish and coarser light orange hairs.

Dimensions (mm): total length 2·52; carapace length 1·28, breadth 0·86; abdomen length 1·36; eyes anterior row 0·78, middle row 0·70, posterior row 0·88; quadrangle length 0·80. *Ratios*: AM : AL : PM : PL :: 7 : 4 : 0·75 : 4·2; AL–PM–PL: 6–7.

DISTRIBUTION. Rennell Island.

MATERIAL EXAMINED. Holotype ♂, RENNELL ISLAND, Hutuna, 16.iii.1965 (*Torben Wolff*) (BMNH reg. no. 1977.4.21.30).

Sobasina scutata sp. n.

(Figs 7A, B; 8C, E, F)

DIAGNOSIS. *S. scutata* is very similar to *S. alboclypea* but can be distinguished by the presence of abdominal scuta and absence of thoracic papillae.

FEMALE. Unknown.

MALE HOLOTYPE. *Carapace* (Fig. 7A, B): eye region papillate; thoracic part dorsally smooth, with sides irregularly punctured; dark orange-brown with an iridescent sheen on the head and sooty thoracic markings; clothed with long recumbent white hairs (mostly rubbed). *Eyes*: with black surrounds; anteriors fringed with white hairs. *Clypeus*: thickly white haired. *Chelicerae*: dark orange-brown; teeth not examined. *Maxillae and labium*: dark orange-brown, labium a shade lighter. *Sternum*: mahogany brown, shiny. *Abdomen* (Fig. 7A, B): with dorsal and ventral scuta; dark orange-brown with blackish markings; clothed with fine white hairs. *Legs*: legs I (Fig. 8C): lacking ventral tibial fringes; femora and metatarsi orange-brown remaining segments pale

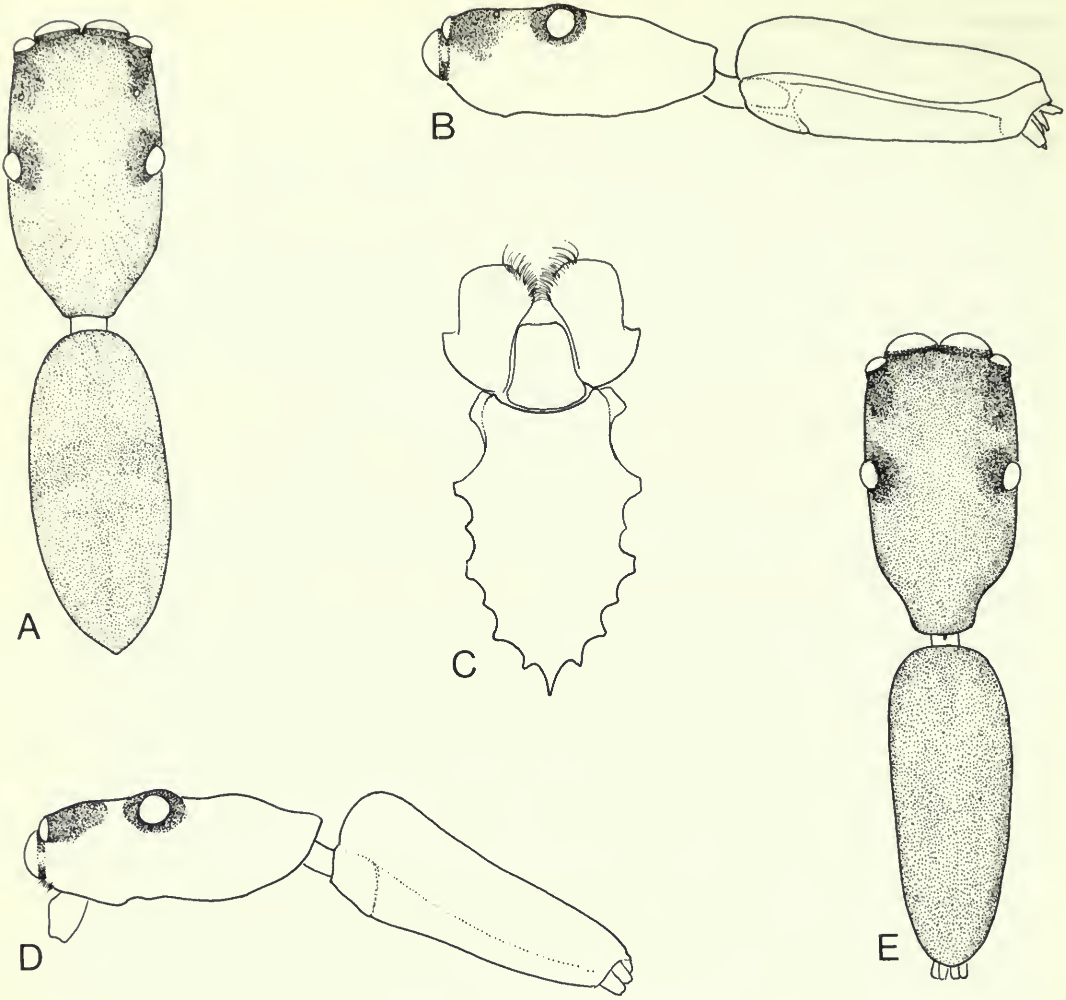

Fig. 7 (A, B) *Sobasina scutata* sp. n., holotype ♂: (A) dorsal view; (B) lateral view; (C–E) *Sobasina alboclypea* sp. n., holotype ♂: (C) sternum, maxillae and labium; (D) lateral view; (E) dorsal view.

yellow. Legs II–III pale yellow. Legs IV pale yellow but coxae, trochanters and femoral sides dark brown. Spination: tibiae: I V 0–2–2; II V 0–1–0; metatarsi: I V 2–2–2 or 2–0–2; II V 0–1–1. *Palp* (Fig. 8E, F): femora and tibia brown, patella and cymbium yellow-brown.

Dimensions (mm): total length 3·24; carapace length 1·48, breadth 0·85; abdomen length 0·76; eyes anterior row 0·76, middle row 0·72, posterior row 0·87; quadrangle length 0·76. *Ratios*: AM : AL : PM : PL :: 6·5 : 3·5 : 0·6 : 4·0; AL–PM–PL: 6–6.

DISTRIBUTION. Bismarck Archipelago, Mussau Island.

MATERIAL EXAMINED. Holotype ♂, BISMARCK ARCHIPELAGO, Mussau, Talumalaus, 20.i.1962 (Noona Dan Expedition 1961–62) (BMNH. reg. no. 1977.4.21.29).

Sobasina alboclypea sp. n.

(Figs 7C–E; 8A, B, D)

DIAGNOSIS. *S. alboclypea* is very similar to *S. scutata* sp. n. but may be distinguished by the absence of abdominal scuta and the presence of thoracic papillae.

Female. Unknown.

Male holotype. *Carapace* (Fig. 7D, E): eye region papillate; thoracic part dorsally smooth, with sides punctured anteriorly to papillate posteriorly; dark brownish orange with an iridescent sheen under some angles of illumination; very sparsely clothed with fine brownish hairs and with a white haired patch above coxae I. *Eyes*: with black surrounds except AM; anteriors fringed with white hairs. *Clypeus*: thickly white haired. *Chelicerae*: dark brownish; teeth not examined. *Maxillae and labium*: dark brownish. *Sternum* (Fig. 7C): dark brownish orange tinged with blackish with clear dark brownish orange margins, shiny. *Abdomen* (Fig. 7D, E): mottled brownish black with a blackish crease along each side; sparsely clothed with short, fine clear hairs and longer fine blackish ones. *Legs*: legs I (Fig. 8A): lacking ventral tibial fringes; coxae, patellae, femora and tarsi yellow-brown, remaining segments dark brown. Legs II yellow-brown but femora and coxae

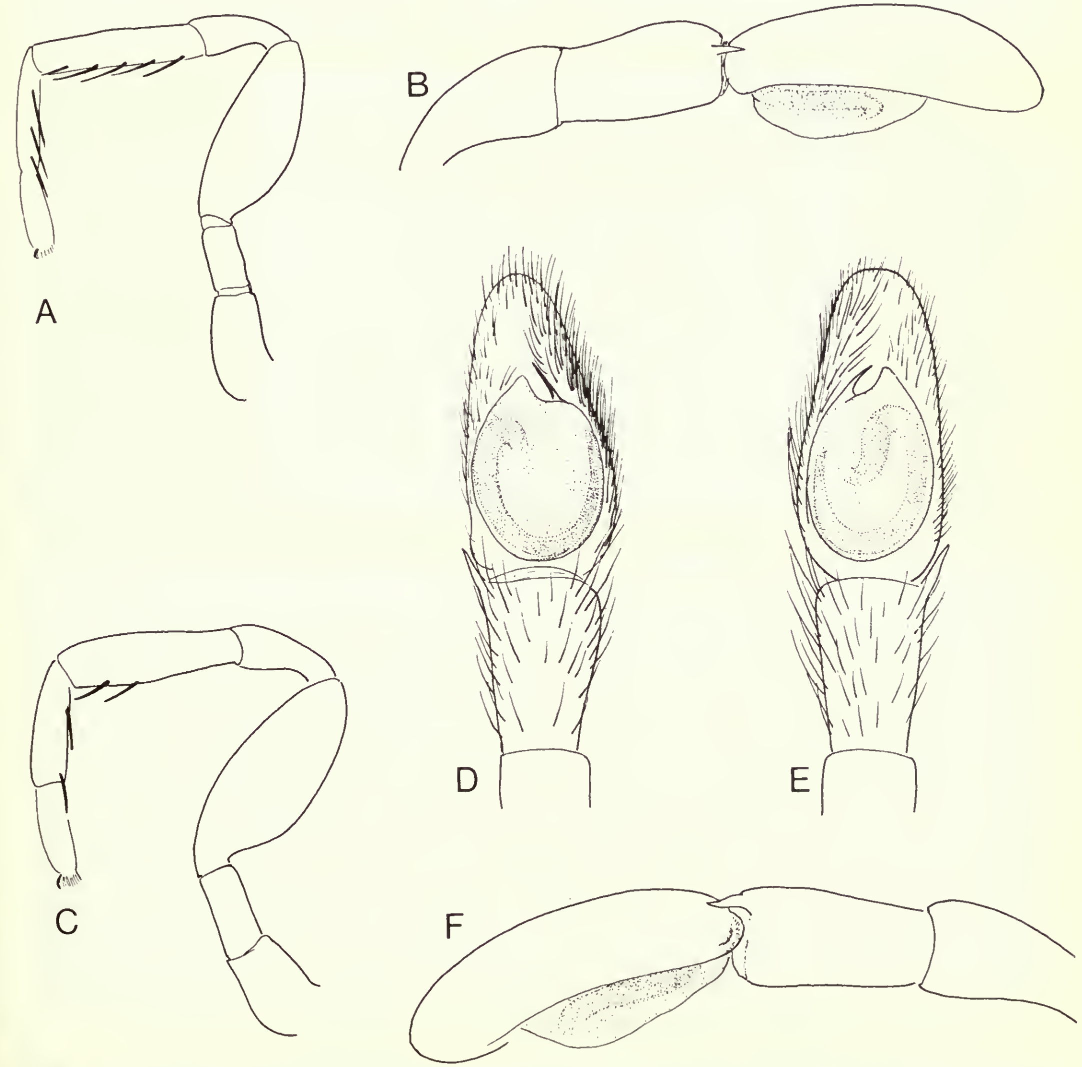

Fig. 8 (A, B, D) *Sobasina alboclypea* sp. n., holotype ♂: (A) leg I; (B) palp, lateral view; (D) palp, ventral view. (C, E, F) *Sobasina scutata* sp. n., holotype ♂: (C) leg I; (E) palp, ventral view; (F) palp, lateral view.

dark brown. Legs III coxae, trochanters and femora dark brown, remaining segments yellow-brown. Legs IV as III but patellae and tibiae dark brown. Spination: tibiae: I V 4–4–2; metatarsi: I V 2–2–2; II V 1–0–1. *Palp* (Fig. 8B, D): dark brown.

Dimensions (mm): total length 3·7; carapace length 1·76, breadth 0·96; abdomen length 1·94; eyes anterior row 0·92, middle row 0·87, posterior row 1·0; quadrangle length 0·88. *Ratios*: AM : AL : PM : PL :: 8 : 4·5 : 1 : 5·5; AL–PM–PL: 6–7.

DISTRIBUTION. Solomon Islands.

MATERIAL EXAMINED. Holotype ♂, SOLOMON ISLANDS, New Georgia Group, Kolombangara, low vegetation, 3000 ft (*P. Naturaga*) Royal Society Expedition 1965 (BMNH reg. no. 1977.4.21.28).

ETYMOLOGY. The specific name refers to the white haired clypeus.

Acknowledgement

I wish to thank M M. Hubert, Muséum National d'Histoire Naturelle, Paris, for the loan of specimens.

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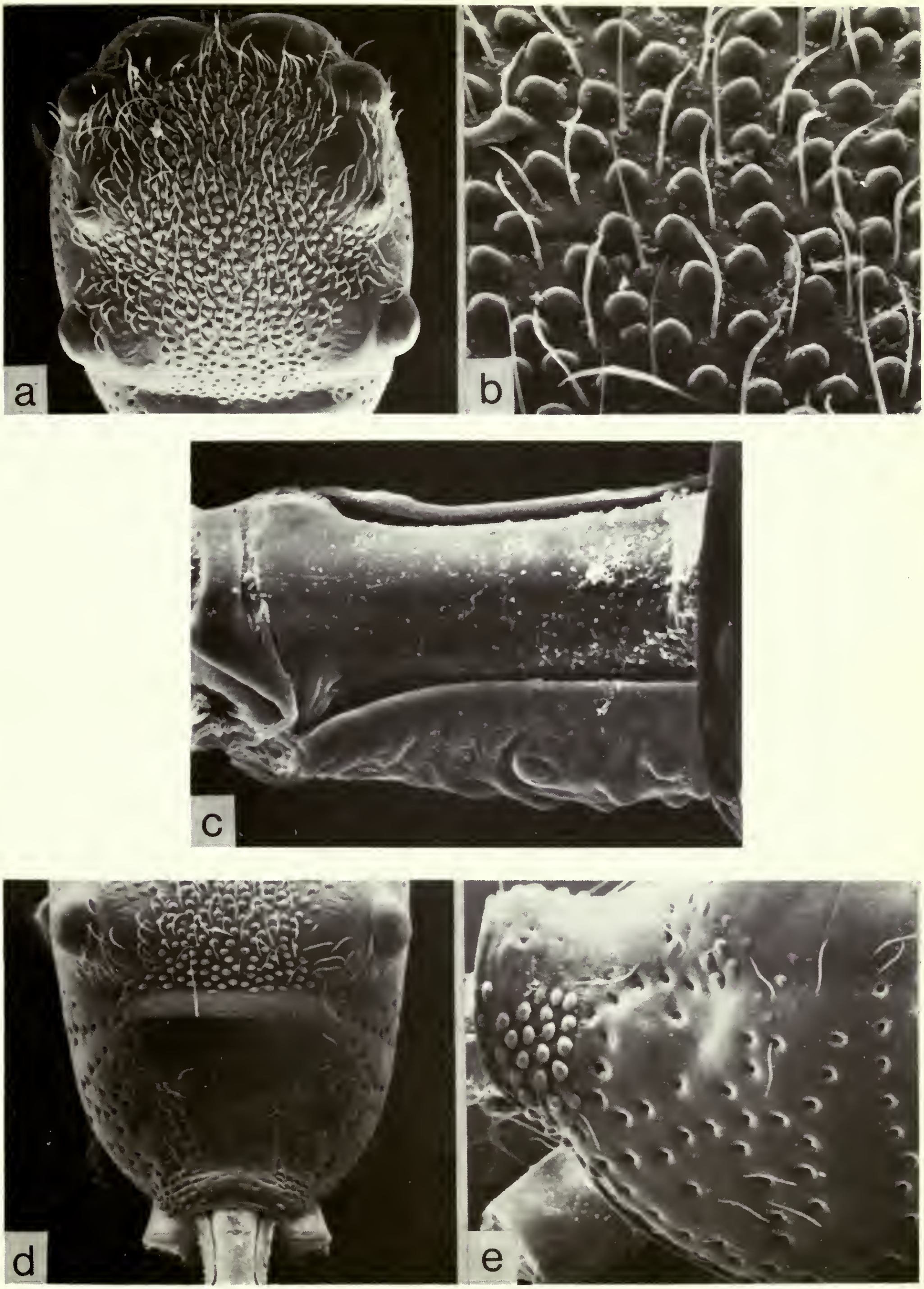

Plate 1 Scanning electron micrographs of *Sobasina solomonensis* sp. n., female. (a, b) Eye region showing papillae, × 100 and × 500. (c) Pedicel, × 500. (d) Posterior part of eye region and thorax showing papillae, smooth areas and punctures, × 100. (e) Posterior part of thorax in lateral view showing punctures and a cluster of papillae, × 200.

A revision of the spider genus *Marengo* (Araneae : Salticidae)

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Introduction

The genus *Marengo* Peckham & Peckham, 1892 is represented in both the Oriental and Ethiopian regions and at present includes nine known species. Seven species occur in the Oriental region, including the type-species *Marengo crassipes* Peckham & Peckham from Sri Lanka and also *M. grammicus* (Simon), from the Philippines, the type-species of *Philates* a poorly known genus regarded here as being synonymous with *Marengo*. The Ethiopian region was formerly represented by two species revised by Roewer (1965). They are now considered to be conspecific, but the number of species in the Ethiopian region remains unaltered as a new taxon from Angola is described in this present paper.

The measurements were made in the manner described by Wanless (1978) and for the leg spination the system adopted is that used by Platnick and Shadab (1975).

Marengo spiders resemble ants and pseudoscorpions in appearance, but their biology is unknown. Most species have the first pair of legs grossly enlarged and would appear to form a good monophyletic group although new taxa from Singapore and Borneo are somewhat divergent in body form. The species can be readily separated by the carapace shape and sculpturing, abdominal pattern and genital structures. Intraspecific variation is apparently not marked, apart from minor differences in the conformation of the epigynal ducts.

Genus *MARENGO* Simon

Marengo Peckham & Peckham, 1892 : 66. Type species *Marengo crassipes* Peckham & Peckham, by monotypy. Simon, 1901 : 488, 491, 492. Petrunkevitch, 1928 : 182. Roewer, 1954 : 938. Bonnet, 1957 : 2714. Roewer, 1965 : 30.

Philates Simon, 1900 : 402. Type species *Philates grammicus* Simon, by original designation. Simon, 1901 : 489, 491–493. Bonnet, 1958 : 3537. Petrunkevitch, 1928 : 183. Roewer, 1954 : 938. **Syn. n.**

Definition. Small spiders ranging from about 2·6 to 4·0 mm in length. Sexes alike in general body form but males with dorsal abdominal scuta and slightly heavier first legs. Colour patterns sometimes present, but usually less distinct in males; not hirsute, carapace often with several scanty patches of white hair. *Carapace*: shape variable, sculpturing variable, fovea lacking. *Eyes*: usually in three rows, rarely four; contiguous or subcontiguous with apices from slightly procurved to strongly recurved; middle row about midway between anterior lateral and posterior lateral eyes or nearer to anterior laterals; posterior row wider than anterior row; quadrangle length between 37 and 44 per cent of carapace length. *Clypeus*: low, backwards sloping. *Chelicerae*: small to medium; more or less subvertical, and usually set well back; promargin with 1–3 teeth, retromargin with 3–5, closely set. *Maxillae*: parallel or convergent. *Labium*: subtriangular. *Sternum*: elongate scutiform. *Pedicel*: short to long, not always visible in dorsal view, anterior dorsal and ventral segments usually well developed with posterior segment vestigial. *Abdomen*: shape variable, scuta sometimes present; spinnerets subequal in length, more or less in three rows, anteriors and medians slender, posteriors robust; tracheae (Fig. 4A) rather stout, branched and arising from transverse slit just in front of spinnerets and extending into cephalothorax; colulus apparently lacking. *Legs*: first pair usually massive with ventral fringe of stiff hairs on tibiae; remaining legs slender; formula 4123, 4132, 1423, 1432; spination: dorsal spines sometimes present on femora, lateral spines usually lacking, ventral spines present on metatarsi I–II but absent on III–IV. Spine sockets of legs I usually with well developed flanges (Pl. 3f). Claw tufts

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present, scopula lacking. *Female palp*: normal. *Male palp* (Fig. 1F, I): tibial apophysis slender; embolus slender, coiled at distal end of tegulum; tegulum with medium seminal reservoir; pars pendula, conductor and median apophysis lacking. *Epigyne* (Fig. 1G, H, J): openings indistinct but sometimes with lightly chitinized depressions (Figs 3B, 5D) leading to convoluted or tangled ducts that terminate as spermathecae which usually have fleshy internal spicules.

The openings of the seminal ducts are usually thick-walled but the course they follow is never completely obvious. Associated with the walls are two knob-like projections with cilia. They are fairly clear in *M. coriacea* and several other species (Figs 1G, 7E, 8E), but there has not been sufficient material to show that they are present in all female *Marengo*.

DIAGNOSIS. *Marengo* is distinguished from other ant-like salticid genera by the following characters. First legs enlarged and usually massive; clypeus backwards sloping; chelicerae small to medium and usually set back. Male palp with simple tibial apophysis and coiled embolus on distal part of tegulum (Fig. 1F). Epigynal opening usually indistinct and sometimes with lightly sclerotized depressions (Figs 1H, 3B); seminal ducts long, convoluted or tangled; spermathecae with fleshy spicules.

AFFINITIES. *Marengo* closely resembles several genera. In the case of *Bellota* from the Neotropical region and *Ligonipes* from Australia the close similarities in general appearance are probably the result of convergence as the genitalia are quite distinct. However, the structure of the male palp, enlarged first legs and general body form suggest that *Marengo* may have affinities with *Mantisatta* from the Oriental and *Cheliferoides* from the Neotropical regions. Both genera are characterized by enlarged raptorial first legs, a tail-like caudal projection (rather short in *Cheliferoides*) and in the male palps a distal coiled embolus. They are readily distinguished from one another by the shape of the carapace and by the eye pattern; *Mantisatta* has four eye rows (Cutler & Wanless, 1973) *Cheliferoides* three. The presence of four eye rows was formerly considered to be diagnostic of lyssomanid spiders, but there are several exceptions: *Athamas*, *Synemosyna* and *Viciria* (Galiano, 1976), and one species of *Marengo*, *M. porosa* sp. n. Unfortunately, the affinities of *Marengo* will remain obscure until revisional studies on other salticid genera have been completed, but in the meantime it seems reasonable to suppose that similarities in body form and genital structures indicate a phylogenetic relationship between *Marengo*, *Mantisatta* and *Cheliferoides*.

List of species in the genus *Marengo* Peckham & Peckham, 1892

Marengo chelifer Simon, 1900
M. coriacea Simon, 1900
M. crassipes Peckham & Peckham, 1892
M. grammicus (Simon, 1900)
M. inornata (Simon, 1900)
M. lyrifera sp. n.
M. porosa sp. n.
M. striatipes Simon, 1900
M. thomsoni sp. n.

Key to species of *Marengo*

Males

1 Eye region punctured reticulate (Pl. 2d) or with numerous piliferous papillae (Pl. 1a, b). (Africa) 2
– Eye region raised reticulate with setae (Pl. 1d–f) or papillate-falsifoveate with setae and scattered papillae (Pl. 3a, b). (Oriental region) 3
2 Carapace with piliferous papillae in eye region and transverse white haired band in postocular depression (Pl. 1a–b); palpal tibial apophysis relatively long, embolus with two or three coils (Fig. 1F, I). (Kenya, South Africa, Tanzania, Zaire) . . . . **coriacea** Simon (p. 261)
– Carapace punctured-reticulate in eye region, white haired band lacking, postocular depression very shallow (Pl. 2d); palpal tibial apophysis relatively short, embolus with four or five coils (Fig. 2E, F). (Angola) . . . . **lyrifera** sp. n. (p. 264)

3 Femora I not grossly enlarged (Fig. 9D). (Java) . . . . . . ***chelifer*** Simon (p. 272)
– Femora I grossly enlarged 4
4 Eye region raised reticulate with setae (Pl. 1d–f), thoracic part papillate-falsifoveate with setae (Pl. 2a–c); chelicerae with inner margins excavated. Palp as in fig. 4C, E. (Sri Lanka) ***crassipes*** Simon (p. 264)
– Eye region and thoracic part low papillate-falsifoveate with setae. Chelicerae with inner margins slightly excavated. Palp as in fig. 10C, J. (Philippines) . . . ***grammica*** (Simon) (p. 272)

Females

1 Carapace with piliferous papillae in eye region and transverse white haired band in postocular depression (Pl. 1a–b); epigyne with slender tangled ducts (Fig. 1G, H, J). (Africa) ***coriacea*** Simon (p. 261)
– Not with combination of characters given above 2
2 Eyes in four rows; thorax perforated (Pls 2e–f, 3c) (Singapore) . . ***porosa*** sp. n. (p. 268)
– Eyes in three rows; thorax otherwise 3
3 Carapace very finely rugulose, rather shiny and with distinct thoracic 'hump' (Fig. 8F). (Borneo) ***thomsoni*** sp. n. (p. 270)
– Carapace otherwise 4
4 Femora of legs I not grossly enlarged (Fig. 5C); carapace from anterior eye row to posterior margin strongly curved in lateral view (Fig. 5B). (Sri Lanka) . . ***striatipes*** Simon (p. 267)
– Femora of legs I grossly enlarged (Figs 3E, 6B); carapace otherwise 5
5 Abdomen with dorsal pattern of longitudinal bands (Fig. 10B); epigynal ducts long and tangled (Fig. 10D, G, H). (Philippines) . . . . ***grammica*** (Simon) (p. 272)
– Abdomen and epigyne otherwise. (Sri Lanka) 6
6 Abdomen with dorsal pattern of white spots and blackish posterior region (Fig. 3A); thoracic slope slightly concave (Fig. 3D) . . . . ***crassipes*** Simon (p. 264)
– Abdomen with poorly defined transverse white band (Fig. 6A); thoracic slope convex (Fig. 6D) ***inornata*** (Simon) (p. 267)

Marengo **coriacea** Simon

(Fig. 1A–J; Pl. 1a–c)

Marengo coriacea Simon, 1900 : 401, ♂. LECTOTYPE ♂ (here designated) South Africa, Natal (MNHN, Paris) [Examined]. Simon, 1901 : 488–491. Lawrence, 1947 : 36. Roewer, 1954 : 938. Bonnet, 1957 : 2714. Roewer, 1965 : 31. Prószyński, 1971 : 427.

Marengo kibonotensis Lessert, 1925 : 439, ♀. Holotype ♀, Tanzania, Kibonoto (NR, Stockholm) [Examined]. Roewer, 1954 : 938. Bonnet, 1957 : 2714. Roewer, 1965 : 31, fig. 26. Prószyński, 1971 : 427. **Syn. n.**

DIAGNOSIS. *M. coriacea* is a fairly distinctive species distinguished from all other *Marengo* by the piliferous papillae in the eye region (Pl. 1a).

MALE FROM KENYA. *Carapace* (Fig. 1A, D): covered with piliferous papillae; dark orange with blackish eye region; clothed with fine whitish hairs, with scanty white-haired vertical bands on thoracic sides and with a band of yellowish hairs in transverse postocular depression. *Eyes*: anteriors more or less contiguous with apices slightly recurved, fringed with white hairs. *Clypeus*: edged with blackish with a submarginal line of white squamous hairs below AL and extending back to level of coxae I. *Chelicerae*: small, vertical with inner margins excavated (in frontal view); brown-black with a weak violet tinge. *Maxillae*: blades rounded, more or less parallel, each with two minute denticles on outer margin (best seen in ventrolateral view); orange-brown. *Labium*: about as long as broad; orange-brown. *Sternum*: similar to ♀; orange-brown suffused with blackish around the margins. *Abdomen* (Fig. 1A): scutum orange-brown tinged with black with broad transverse orange bands anteriorly and with two impressed blackish lines medially, shiny; clothed with fine black hairs and fine white ones on the orange bands; venter whitish yellow mottled with blackish. *Legs*: Legs I (Fig. 1C): massive; coxae, trochanters, femora, patellae and tibiae grossly enlarged; ventral tibial fringe composed of black lanceolate hairs; spines robust with well-developed socket flanges; tarsi yellow-brown with prolateral sides blackish, remaining

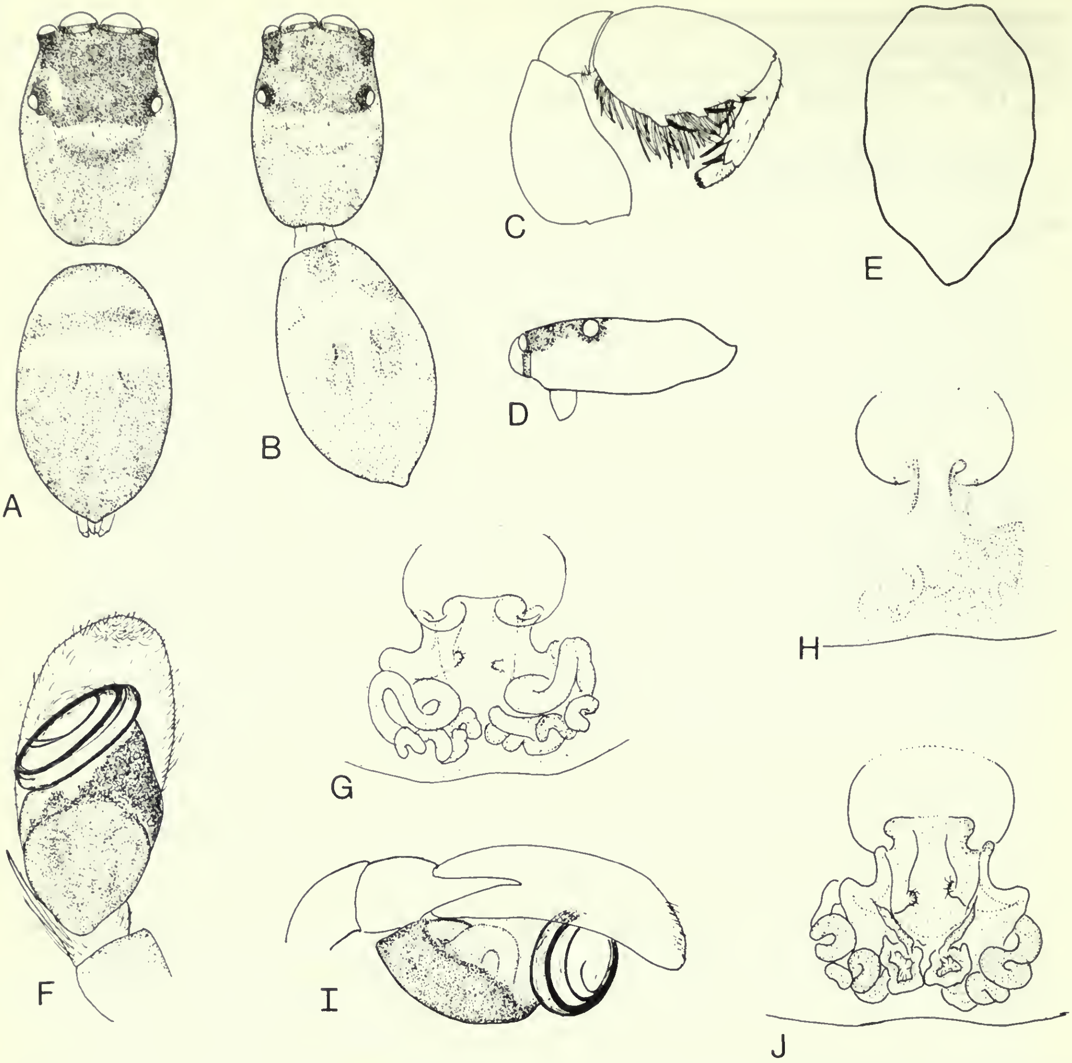

Fig. 1 *Marengo coriacea* Simon, ♂ from Kenya: (A) dorsal view; (D) carapace, lateral view. Lectotype ♂: (C) leg I; (F) palp, ventral view; (I) palp, lateral view. ♀ from Kenya: (B) dorsal view; (E) sternum; (G) vulva, ventral view; (H) epigyne; (J) vulva, dorsal view.

segments dark orange. Legs II–IV: femora orange streaked with black; remaining segments yellow-brown with black prolateral streaks on tibiae and metatarsi. Spination: femora: I D 0–2–0; II D 0–1–1, III–IV D 0–1–0; tibiae: I V 0–4–2, II V 1–1–0; metatarsi: I V 0–0–4, II V 0–1–0. *Palp* (Fig. 1F, I): brownish orange; diameter of coiled embolus relatively large.

Dimensions (mm): total length 3·5; carapace length 1·54, breadth 1·14; abdomen length 1·78; eyes anterior row 0·86, middle row 0·83, posterior row 0·98; quadrangle length 0·62. *Ratios*: AM : AL : PM : PL :: 8 : 3·5 : 0·75 : 3·5; AL–PM–PL: 5–5.

Female from Kenya. Sculpturing, colour and body form similar to ♂. *Clypeus*: lacking submarginal line of white hairs. *Chelicerae*: inner margins not excavated; yellow-brown tinged with blackish, shiny; promargin and retromargin with 3 teeth. *Maxillae*: blades rounded, outer marginal denticles lacking. *Sternum* (Fig. 1E): orange-brown lightly tinged with blackish. *Abdomen*

(Fig. 1B): scutum lacking; dorsum pinkish grey with a white transverse band just in front of the middle and with three orange-brown patches, the posterior pair with an impressed brownish orange line; clothed with fine blackish and fine shiny white hairs; spinnerets pale yellow-brown. *Legs*: similar to ♂. Spination: femora: I D 0–2–0, II–IV D 0–0–1; tibiae: I V 0–4–2, II V 1–0–0; metatarsi: I V 0–2–2. *Palp*: femora and patellae light brown, remaining segments whitish yellow. *Epigyne* (Fig. 1G, H, J): pale.

Dimensions (mm): total length 3·28; carapace length 1·44, breadth 0·96; abdomen length 1·72; eyes anterior row 0·84, middle row 0·76, posterior row 0·90; quadrangle length 0·58. *Ratios*: AM : AL : PM : PL :: 7 : 3·5 : 1 : 3; AL–PM–PL: 5–4·5.

VARIATION. ♂ total length varies from 3·2 to 3·5 mm, carapace length 1·5–1·54 mm (three specimens). ♀ total length varies from 3·2 to 3·4 mm, carapace length 1·32–1·52 mm (three specimens).

Most specimens examined have been rubbed and have lost their colour but the impressed lines on the male abdomen and the patches on the female are usually retained.

DISTRIBUTION. Kenya, South Africa, Tanzania, Zaire.

MATERIAL EXAMINED. Type data given in synonymy. KENYA: Naivasha, 6000 ft, 1 ♂, 1 ♀, 3.viii.1974 (*J. & F. Murphy*); Nairobi, 1 ♂, vi.1970 (*A. Evans*) (BMNH). ZAIRE: Kivu, vallée da la moyenne Semliki, 1 ♀, 1.viii.1968 (R. P. M. Lejeune, MT. 135.697) (MRAC, Tervuren).

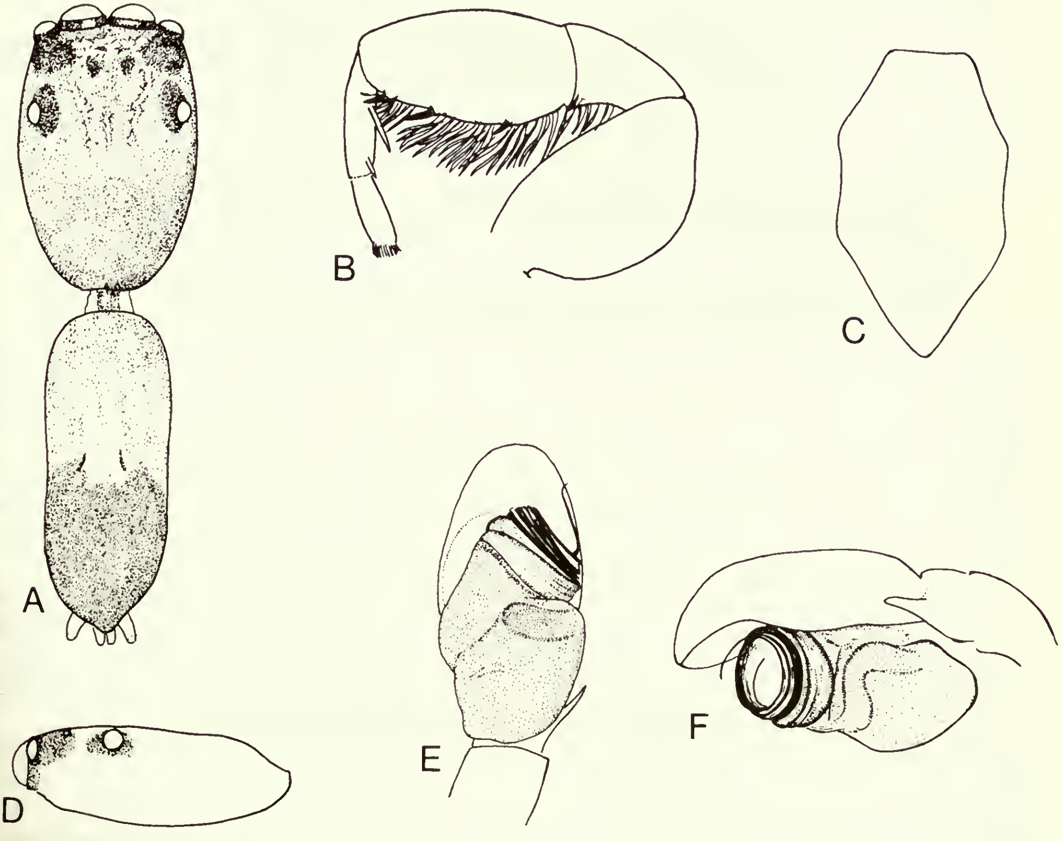

Fig. 2 *Marengo lyrifera* sp. n., holotype ♂: (A) dorsal view; (B) leg I; (C) sternum; (D) carapace, lateral view; (E) palp, ventral view; (F) palp, lateral view.

Marengo lyrifera sp. n.

(Fig. 2A–F)

DIAGNOSIS. *M. lyrifera* is the only species of *Marengo* to have punctured-reticulate sculpturing in the eye region (Pl. 2d). Its affinities are uncertain.

FEMALE. Unknown.

MALE HOLOTYPE. *Carapace* (Fig. 2A, D): punctured-reticulate; orange-brown with lyriform pattern of yellowish guanin in eye region. *Eyes*: with black surrounds; anteriors contiguous with apices level, fringed with white hairs. *Clypeus*: edged with blackish. *Chelicerae*: medium, slightly porrect with inner margins excavated; orange-brown; promargin and retromargin with 3 teeth. *Maxillae*: blades rounded, slightly convergent, each with two minute denticles on outer margin (best seen in venterolateral view when legs I have been removed); light yellowish orange. *Labium*: about as long as broad; dark orange-brown. *Sternum* (Fig. 2C): pale yellow-orange. *Abdomen* (Fig. 2A): pale yellow-brown lightly tinged with blackish with the posterior blackish; spinnerets light yellow. *Legs*: legs I (Fig. 2B): massive, coxae, trochanters, femora, patellae and tibiae grossly enlarged; ventral tibial fringe composed of orange-brown hairs; spines robust with moderately developed socket flanges; light orange with tarsi and metatarsi light yellow. Remaining legs pale yellowish with some blackish prolateral streaks. Spination: femora: I D 0–1–1, II D 0–2–1, III D 0–1–1, IV D 1–1–2; tibiae I V 2–2–2; II V 1–1–0; metatarsi I V 0–2–2, II V 1–0–1, P 0–0–1. *Palp* (Fig. 2E–F): light orange.

Dimensions (mm): total length 3·92; carapace length 1·72, breadth 1·16; abdomen length 1·96; eyes anterior row 1·0, middle row 0·92, posterior row 1·1; quadrangle length 0·64. *Ratios*: AM : AL : PM : PL :: 8 : 4·5 : 1 : 4·5; AL–PM–PL: 5–5·5.

VARIATION. Not observed.

DISTRIBUTION. Angola.

MATERIAL EXAMINED. Holotype ♂, ANGOLA, Lake Calundo, 11·48S, 20·52E; 18.xi.1954 (*A. de Barros Machado*, Ang. 4414.5).

ETYMOLOGY. The specific name refers to the carapace pattern.

Marengo crassipes Peckham & Peckham

(Figs 3A–F; 4A–F; Pls 1d–f; 2a–c)

Marengo crassipes Peckham & Peckham, 1892 : 66, pl. V, fig. 4, 4a–c, ♀. LECTOTYPE ♀ (here designated) Sri Lanka (MCZ, Harvard) [Examined]. Simon, 1900 : 401; 1901 : 488–492. Petrunkevitch, 1928 : 182. Roewer, 1954 : 938. Bonnet, 1957 : 2714. Prószyński, 1971 : 427.

Marengo nitida Simon, 1900 : 401, ♂. LECTOTYPE ♂ (here designated) Sri Lanka, Kandy (MNHN, Paris) [Examined]. Simon, 1901 : 488–491. Sherriffs, 1931 : 539. Roewer, 1954 : 938. Bonnet, 1957 : 2714. Prószyński, 1971 : 427. **Syn. n.**

Marengo crassipes and *M. nitida* have both been taken from the same locality (Kandy, Sri Lanka) and it is almost certain that *nitida* known only from the male is conspecific with *crassipes*, known only from the female.

DIAGNOSIS. *M. crassipes* is most closely related to *M. inornata* (Simon) and *M. striatipes* Simon. Females are fairly distinctive and can be readily distinguished by the white abdominal markings (Fig. 3A). Males are characterized by the shiny abdomen and similar, but suppressed markings of the female. A more positive male diagnosis cannot be given as males of *inornata* and *striatipes* are unknown.

MALE FROM SRI LANKA (lectotype of *M. nitida*). *Carapace* (Fig. 4B): eye region raised reticulate with setae (Pl. 1d–f), thoracic part papillate-falsifoveate with setae (Pl. 2a–c); reddish orange, paler in eye region with scanty white haired bands just behind PL and on thorax. *Eyes*: with black surrounds; anteriors contiguous with apices slightly recurved, fringed with whitish hairs. *Clypeus*: sparsely fringed with fine light orange hairs. *Chelicerae*: small, more or less vertical with inner margins excavated; orange-brown; teeth not examined. *Maxillae* (Fig. 4D): blades

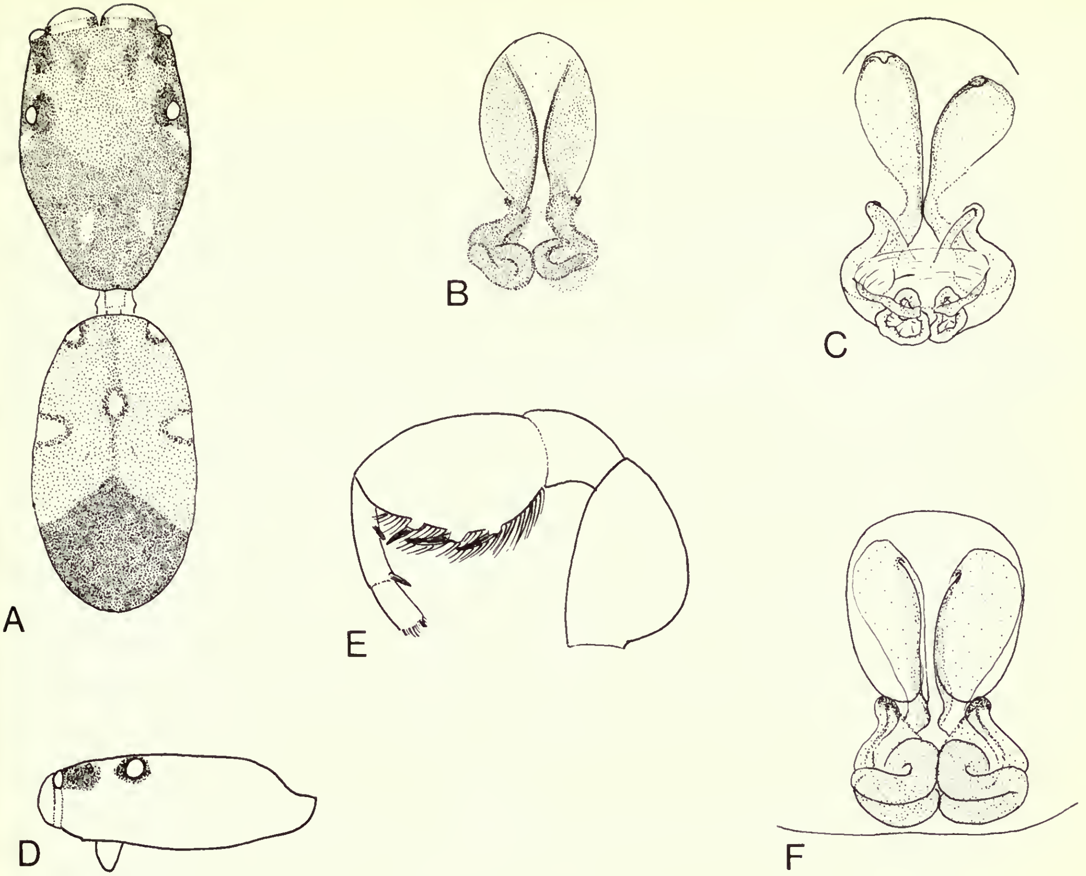

Fig. 3 *Marengo crassipes* Simon, ♀: (A) dorsal view; (B) epigyne; (C) vulva, ventral view; (D) carapace, lateral view; (E) leg I; (F) vulva, ventral view.

angular, light orange. *Labium*: with slight lateral depressions; pale orange. *Sternum* (Fig. 4F): light orange, shiny with shallow depressions opposite coxae I. *Abdomen* (Fig. 4B): scutum glossy orange-brown with faint blackish posterior and two curved impressions; venter light yellowish with blackish mottling; sparsely covered with fine short light orange hairs, and with vague lateral white haired patches; spinnerets pale yellow. *Legs*: legs I massive, coxae, trochanters, femora, patellae and tibiae grossly enlarged; ventral tibial fringe composed of light brownish hairs; spines robust with well-developed socket flanges; generally orange-brown, but distal part of metatarsi and tarsi whitish. Remaining legs light yellow with blackish prolateral streaks. Spination: femora: I D 0–1–1, II–III D 0–0–2, IV D 0–0–1; tibiae: I V 0–3–1, II V 1–0–0; metatarsi: I V 0–2–2. *Palp* (Fig. 4C, E): femora light yellow-brown, distal segments whitish.

Dimensions (mm): total length 3·24; carapace length 1·68, breadth 1·20; abdomen length 1·60; eyes anterior row 0·92, middle row 0·86, posterior row 1·04; quadrangle length 0·61. *Ratios*: AM : AL : PM : PL :: 9 : 4 : 0·75 : 3·5; AL–PM–PL: 4–6.

FEMALE FROM SRI LANKA. Very similar to male but abdominal pattern much more distinctive. *Chelicerae*: small, vertical, inner margins not excavated; orange-brown, shiny; promargin with 2 teeth, retromargin with 3 or 5. *Abdomen* (Fig. 3A): scutum lacking; light yellowish with black posterior, and pattern of shiny, white haired spots bordered with black, also a median sooty band from anterior margin to posterior black region; spinnerets light yellowish. *Legs* more or less as in male. Spination: femora: I D 0–1–0; tibiae: I V 0–3–2, II V 0–1–0; metatarsi: I V 2–0–2. *Palp*: pale yellow. *Epigyne* (Fig. 3B, C, F).

Dimensions (mm): total length 3·20; carapace length 1·48; breadth 0·96; abdomen length 1·64; eyes anterior row 0·80, middle row 0·76, posterior row 0·90; quadrangle length 0·56. *Ratios*: AM : AL : PM : PL :: 7·5 : 3 : 0·6 : 3·5; AL–PM–PL: 4–4·5.

VARIATION. ♂ total length varies from 3·0 to 3·54 mm, carapace length 1·56–1·76 mm (four specimens). ♀ total length varies from 3·2 to 3·54 mm, carapace length 1·48–1·56 mm (three specimens).

DISTRIBUTION. ? India, Sri Lanka.

MATERIAL EXAMINED. Type data given in synonymy. SRI LANKA: Galle, 2 ♂♂, (*E. Simon*); Kandy, 2 ♀♀ (*E. Simon*) (MNHN, Paris).

Sherriffs (1931) records this species from Koyencolam, Travancore, Southern India, but the specimen, a male, has not been examined.

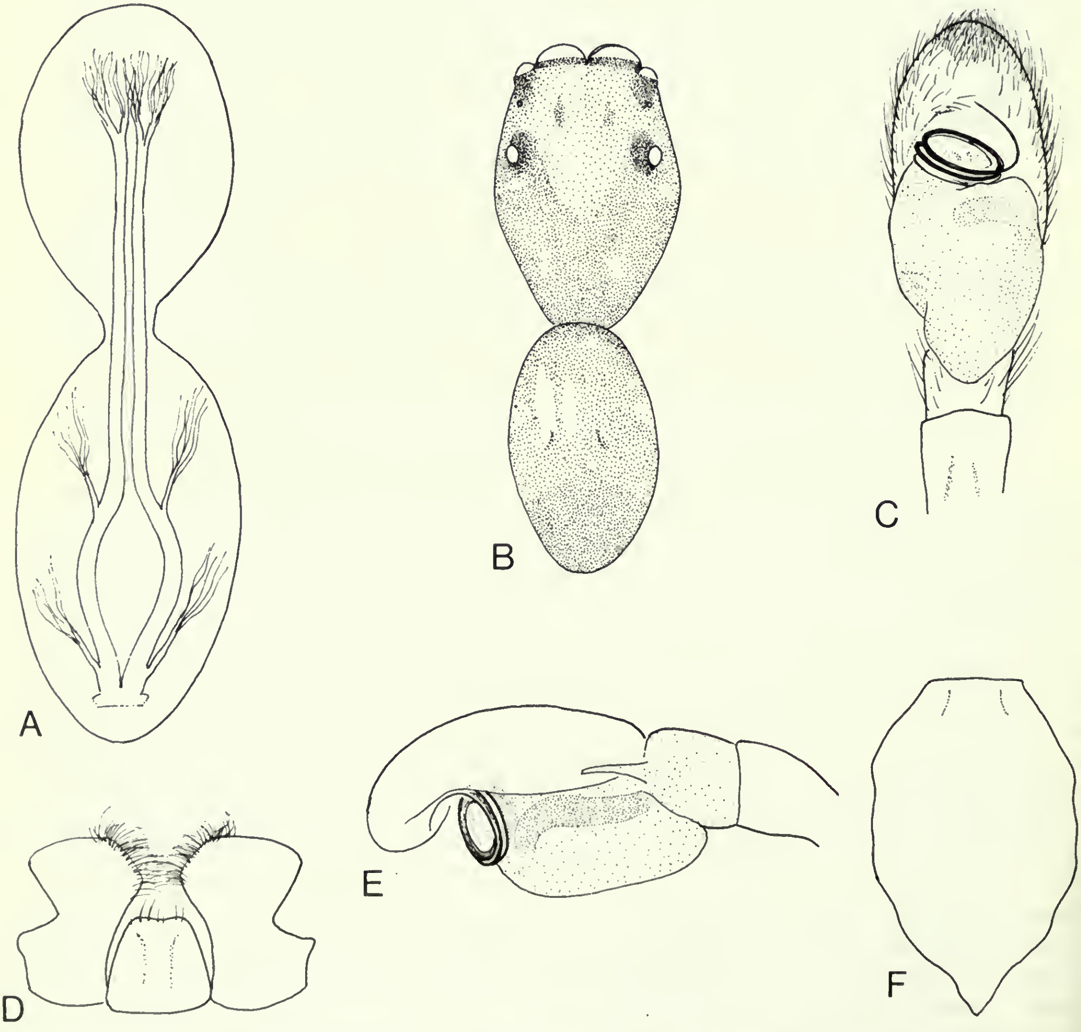

Fig. 4 *Marengo crassipes* Simon, ♂: (A) tracheal system, schematic; (B) dorsal view; (C) palp, ventral view; (D) maxillae; (E) palp, lateral view; (F) sternum. (B–F, lectotype ♂ of *M. nitida* Simon.)

Marengo striatipes Simon

(Fig. 5A–D)

Marengo striatipes Simon, 1900 : 400, ♀. LECTOTYPE ♀ (here designated) Sri Lanka, Colombo (MNHN, Paris) [Examined]. Simon, 1901 : 488–491. Sherriffs, 1931 : 538. Roewer, 1954 : 938. Bonnet, 1957 : 2714. Prószyński, 1971 : 427.

DIAGNOSIS. *M. striatipes* is a fairly distinctive species readily separated from other *Marengo* in the Oriental region by the shape of the carapace (Fig. 5B) and the more or less slender femora I (Fig. 5C). The affinities are uncertain but the epigyne is similar to those found in *M. crassipes* Simon and *M. inornata* (Simon).

MALE. Unknown.

FEMALE LECTOTYPE. *Carapace* (Fig. 5A, B): eye region finely rugulose with moderately numerous punctures, thoracic part moderately papillate-falsifoveate with setae; orange-brown, shiny. *Eyes*: with black surrounds; anteriors contiguous with apices recurved, fringed with whitish hairs. *Clypeus*: very sparsely fringed with light orange hairs. *Chelicerae*: small, vertical, inner margins not excavated; pale yellow-brown, shiny. *Maxillae*: blades more or less rounded, convergent; light yellow-brown, shiny. *Labium*: about as long as broad; brownish black. *Sternum*: elongate scutiform; orange-brown tinged with blackish, shiny. *Abdomen* (Fig. 5A): orange-brown tinged with blackish with two whitish spots joined by a transverse band; spinnerets pale yellow tinged with black. *Legs*: legs I (Fig. 5C) with patellae and tibiae grossly enlarged; ventral tibial fringe composed of brown-black lanceolate hairs; spines robust with well-developed socket flanges; femora light yellow with black prolateral and dorsal stripes, patellae light yellow with blackish distal prolateral edging, tibiae orange-brown; tarsi and metatarsi light yellow, the latter with short prolateral stripes proximally. Remaining legs light yellow with black prolateral stripes. Spination: tibiae: I V 0–2–4; metatarsi: I V 0–2–2. *Palp*: light yellow. *Epigyne* (Fig. 5D): vulva not examined.

Dimensions (mm): total length 2·64; carapace length 1·16, breadth 0·78; abdomen length 1·36; eyes anterior row 0·65, middle row 0·60, posterior row 0·70; quadrangle length 0·46. *Ratios*: AM : AL : PM : PL :: 6 : 2·5 : 0·6 : 2·5; AL–PM–PL: 3–4.

VARIATION. Not observed.

DISTRIBUTION. Sri Lanka.

MATERIAL EXAMINED. Lectotype female.

Marengo inornata (Simon) comb. nov.

(Fig. 6A–E)

Philates inornatus Simon, 1900 : 403, ♀. LECTOTYPE ♀ (here designated) Sri Lanka, Kandy (MNHN, Paris) [Examined]. Simon, 1901 : 491, 493. Roewer, 1954 : 938. Bonnet, 1958 : 3537. Prószyński, 1971 : 457.

DIAGNOSIS. *M. inornata* is most closely related to *M. crassipes* Simon and *M. striatipes* Simon, but may be distinguished by the shape of the carapace (Fig. 6D), the apparent absence of distinct markings, the short pedicel and enlarged femora I (Fig. 6B).

MALE. Unknown.

FEMALE LECTOTYPE. *Carapace* (Fig. 6A, D): raised reticulate with setae; dark orange-brown with scanty thoracic patches composed of short, fine clear whitish hairs. *Eyes*: with blackish surrounds except AM; anteriors subcontiguous with apices level, fringed with brown and fine white hairs. *Clypeus*: sparsely fringed with fine whitish hairs. *Chelicerae*: small, vertical, inner margins not excavated; light brown; teeth not examined. *Maxillae*: convergent, outer distal corner of blade slightly extended. *Labium*: slightly broader than long; orange-brown. *Sternum* (Fig. 6C): orange-brown, shiny. *Abdomen* (Fig. 6A, D): light brownish orange with small brownish patch and two impressed dots anteriorly; clothed with fine short light orange hairs with an obscure transverse

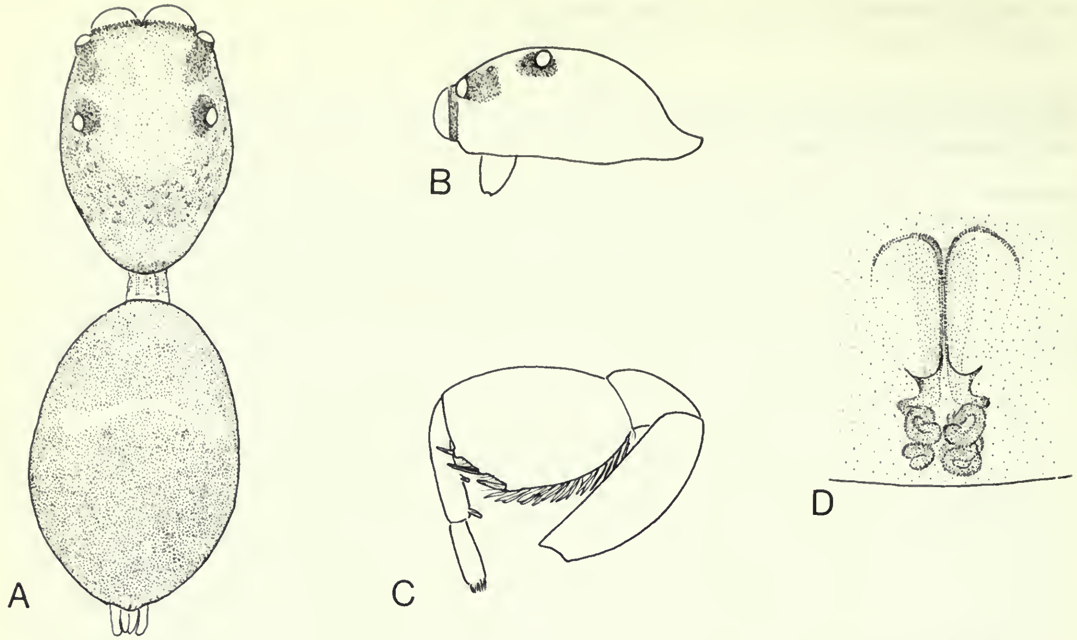

Fig. 5 *Marengo striatipes* Simon, lectotype ♀: (A) dorsal view; (B) carapace, lateral view; (C) leg I; (D) epigyne.

band of fine clear hairs; spinnerets light brownish orange. *Legs*: legs I (Fig. 6B): with coxae, trochanters, femora, patellae and tibiae grossly enlarged; ventral tibial fringe of brown-black hairs; spines robust with moderately well developed socket flanges; orange-brown but metatarsi and tarsi lighter. Remaining legs yellow-brown with blackish brown femora and blackish brown prolateral streaks on patellae and tibiae. Spination: femora: IV D 0–0–1; tibiae: I V 1–1–2, II V 0–1–0. *Palp*: femora and patella brown, tibiae and tarsi yellow. *Epigyne* (Fig. 6E): small and similar to that of *M. crassipes*.

Dimensions (mm): total length 3·76; carapace length 1·52, breadth 1·0; abdomen length 2·2; eyes anterior row 0·88, middle row 0·84, posterior row 0·98, quadrangle length 0·60. *Ratios*: AM : AL : PM : PL :: 8 : 3·5 : 0·75 : 3·5; AL–PM–PL; 6–11.

VARIATION. Not observed.

DISTRIBUTION. Sri Lanka.

MATERIAL EXAMINED. Lectotype female.

Marengo porosa sp. n.

(Fig. 7A–G; Pls 2e–f; 3a–f)

DIAGNOSIS. *M. porosa* is a very distinctive species readily distinguished from all other *Marengo* by having four eye rows (Fig. 7A) and a perforated thorax (Pls 2f; 3c–e). Its affinities are uncertain.

MALE. Unknown.

FEMALE HOLOTYPE. *Carapace* (Fig. 7A, F; Pls 2e–f; 3a–e): papillate-falsifoveate with setae and scattered papillae (Pl. 3a–b); thoracic part perforated, each cavity with an associated piliferous papilla (Pl. 3c–e); below PL and on the sides of the head the papillae are low or absent, but the setae remain (Pl. 2e–f); dark orange-brown with eye region lighter. *Eyes*: on tubercles; with black surrounds; anteriors contiguous with apices strongly recurved, sparsely fringed with white hairs. *Clypeus*: with several stiff hairs. *Chelicerae*: small, vertical, inner margins not excavated; yellow-brown suffused with some black, shiny; promargin with 2 teeth, retromargin with 4. *Maxillae*: blades more or less rounded, convergent; light orange tinged with some black. *Labium*: about as long as broad; light orange tinged with some black. *Sternum* (Fig. 7G): orange. *Abdomen* (Fig. 7A, F): brown-black, shiny with white lateral spots and dorsal bands; venter whitish; spinnerets light yellow-brown. *Legs*: legs I (Fig. 7C; Pl. 3f): with coxae, trochanters, femora, patella and tibiae enlarged; ventral tibial fringe composed of stiff black hairs in a line restricted to proventral side of segment; spines robust with well developed socket flanges; yellow-brown to orange-brown with blackish markings. Spination: femora: I D 0–0–1; tibiae: I V 2–4–2, II V 2–2–0; metatarsi: I V 0–2–2, II V 2–0–2. *Palp*: femora distally and patellae brown-black, rest of femora and other segments white. *Epigyne* (Fig. 7B, D, E): rather pale.

Dimensions (mm): total length 3·96; carapace length 2·08, breadth 1·20; abdomen length 1·76; eyes anterior row 1·06, middle row 0·89, posterior row 1·14; quadrangle length 0·92. *Ratios*: AM : AL : PM : PL :: 11·5 : 5·6 : 1 : 5·6; AL–PM–PL: 6–7.

VARIATION. A paratype ♀ measures 4·20 mm total length, 2·04 mm carapace length.

DISTRIBUTION. Malaysia.

MATERIAL EXAMINED. Holotype ♀, MALAYSIA, Frasers Hill, Jeriav Waterfall area, on vine, 7.ix.1973 (*A. D. Blest*, vial 21D) (BMNH reg. no. 1977.4.29.8). Paratype: MALAYSIA: Frasers Hill, 1 ♀, 6.ix.1973 (*A. D. Blest*, vial 18B) (BMNH).

REMARKS. The four eye rows and unusual sculpturing suggest that *M. porosa* could have been described in a new genus. However, such a proposal cannot be justified at the present time in

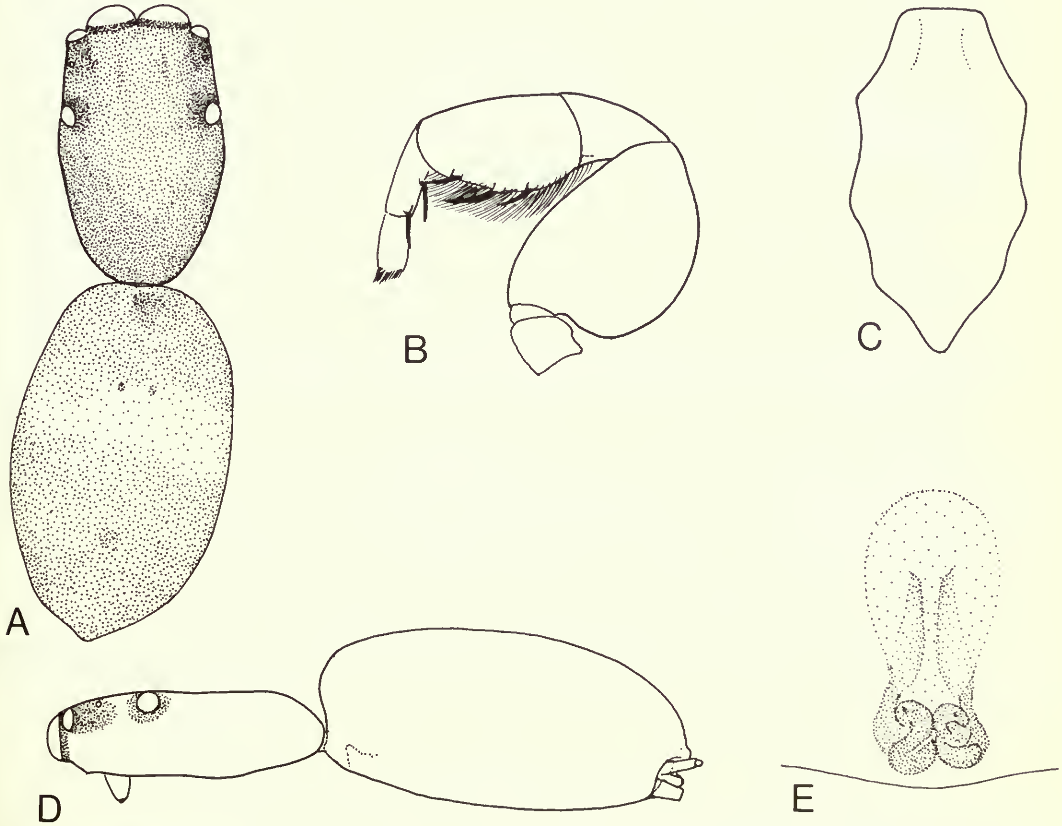

Fig. 6 *Marengo inornata* (Simon), lectotype ♀: (A) dorsal view; (B) leg I; (C) sternum; (D) lateral view; (E) epigyne.

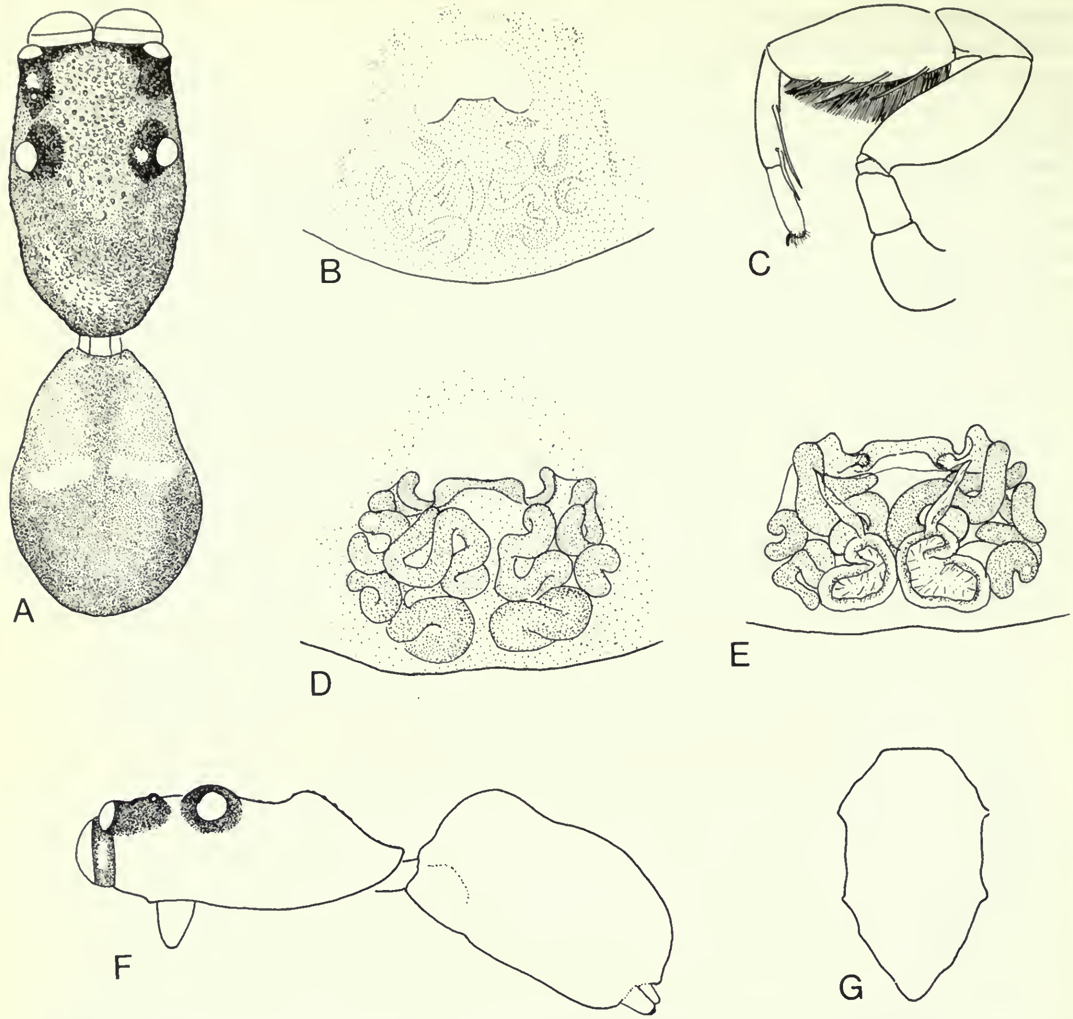

Fig. 7 *Marengo porosa* sp. n., holotype ♀: (A) dorsal view; (B) epigyne; (C) leg I; (D) vulva, ventral view; (E) vulva, dorsal view; (F) lateral view; (G) sternum.

view of the systematic difficulties which occur in the Salticidae. It is always possible that an available genus already exists among the numerous, poorly known, monotypic genera which have been described in this family, e.g. see Wanless (1977/8). Furthermore, the creation of numerous genera tends to obscure relationships which can be more clearly and less formally expressed in terms of 'species groups' or in cases where affinities are unknown as 'species sola'. One has also to consider the fact that in warmer regions of the world there are many new species to be described which will inevitably fill gaps in our knowledge, alter generic concepts and lead to a better understanding of phylogenies so that in time, a more balanced judgement can be brought to bear on the problems found in this family.

Marengo thomsoni sp. n.

(Fig. 8A–F)

DIAGNOSIS. *M. thomsoni* is a very distinctive species readily separated from all other species of *Marengo* by the shape of the carapace (Fig. 8A, F). Its affinities are uncertain but the epigyne

(Fig. 8B, D, E) would seem to show some similarities with those of *M. coriacea* Simon and *M. porosa* sp. n.

Male. Unknown.

Female holotype. *Carapace* (Fig. 8A, F): very finely rugulose, shiny; orange-brown with blackish markings, with a series of four white haired spots in thoracic depression and a white haired marginal spot at level of coxae III. *Eyes*: anteriors contiguous with apices procurved, sparsely fringed with fine whitish hairs. *Clypeus*: brown tinged with blackish. *Chelicerae*: small, vertical, inner margins not excavated; yellow-brown; teeth not examined. *Maxillae*: more or less parallel, blades slightly truncate; yellow-brown. *Labium*: about as long as broad; yellow-brown with some blackish. *Sternum* (Fig. 8C): yellow-brown with posterior margins, darker, shiny. *Pedicel*: rather long and stalk like. *Abdomen* (Fig. 8A, F): black with an ill-defined glossy, brown-black scutum, which has a violet sheen under some lights; sparsely clothed with very fine hairs and with three white haired spots; spinnerets light yellow. *Legs*: legs I: coxae, trochanters, femora, patellae and tibiae enlarged; ventral tibial fringe lacking; spines slender, socket flanges apparently lacking;

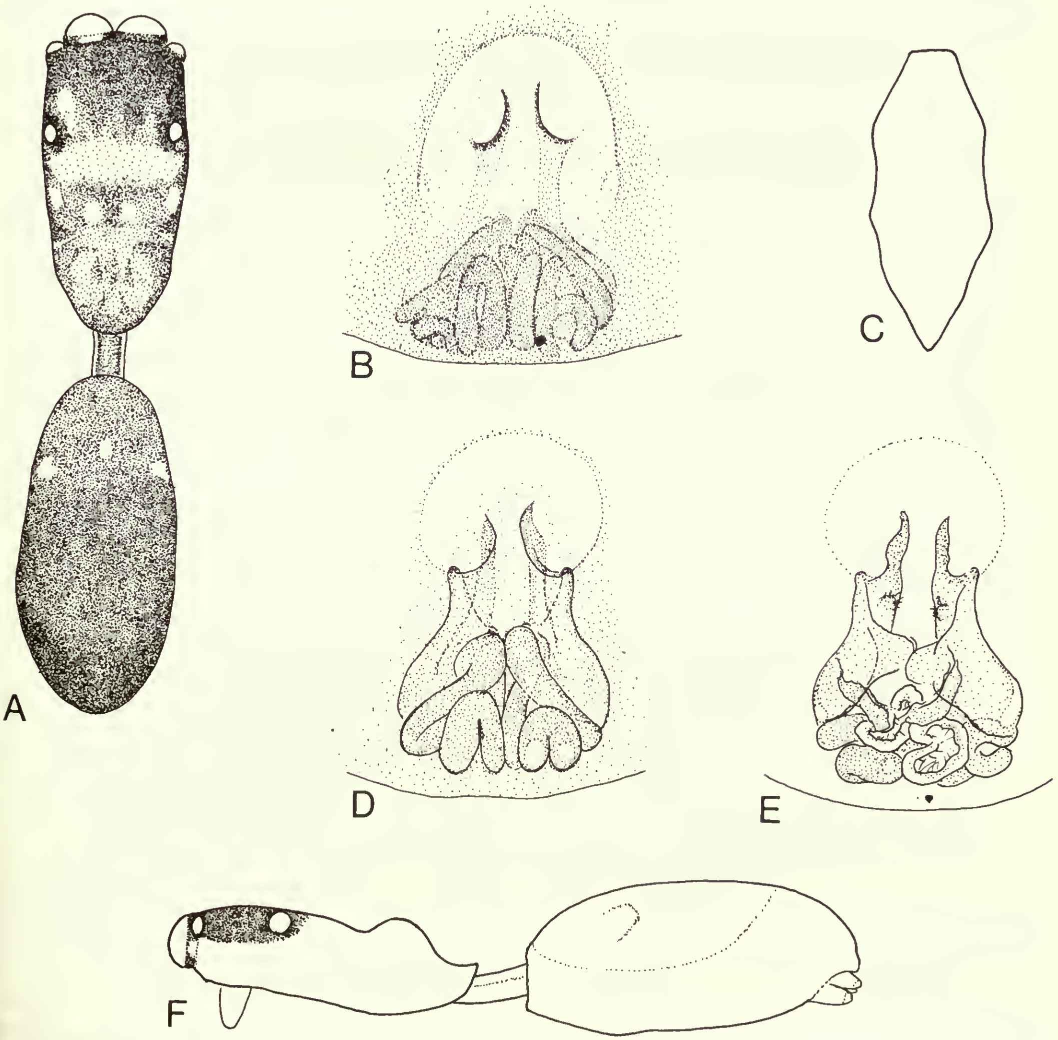

Fig. 8 *Marengo thomsoni* sp. n., holotype ♀: (A) dorsal view; (B) epigyne; (C) sternum; (D) vulva, ventral view; (E) vulva, dorsal view; (F) lateral view.

yellow-brown but prolateral surface of tibiae blackish. Legs II slender, colour as I. Legs III–IV yellow-brown to pale yellow-brown with black markings especially on femora, patellae and tibiae. Spination: tibiae: I V 2–1–2, II V 0–1–0; metatarsi I V 0–2–2. *Palp*: pale yellow. *Epigyne* (Fig. 8B, D, E).

Dimensions (mm): total length 2·48; carapace length 1·08, breadth 0·54; abdomen length 1·24; eyes anterior row 0·53, middle row 0·48, posterior row 0·54; quadrangle length 0·36. *Ratios*: AM : AL : PM : PL :: 5·5 : 2·4 : 0·5 : 2·5; AL–PM–PL: 3–3.

VARIATION. Unknown.

DISTRIBUTION. Borneo.

MATERIAL EXAMINED. Holotype ♂, BORNEO, Makunjung, 21.iv.1976 (*R. Thomson*) (BMNH reg. no. 1977.4.29.9).

Marengo chelifer Simon

(Fig. 9A–F)

Marengo chelifer Simon, 1900 : 400, ♂. LECTOTYPE ♂ (here designated) Java, Buitenzorg (MNHN, Paris) [Examined]. Simon, 1901 : 488–491. Roewer, 1954 : 938. Bonnet, 1957 : 2714. Prószyński, 1971 : 427.

DIAGNOSIS. *M. chelifer* can be distinguished from other known species by the shape of the carapace (Fig. 9A, C), slender femora I and elongate first legs (Fig. 9D).

FEMALE. Unknown.

MALE LECTOTYPE. *Carapace* (Fig. 9A, C): raised reticulate with setae in eye region to 'radiating' papillate-falsifoveate with setae on thoracic part; reddish orange with very scanty, white haired bands just behind PL and on thoracic part. *Eyes*: with black surrounds; anteriors contiguous with apices more or less level, sparsely fringed with whitish hairs. *Clypeus*: sparsely fringed with light orange hairs. *Chelicerae*: small, vertical, inner margins not excavated; light yellow-brown; teeth not examined. *Maxillae*: blades slightly convergent; light orange. *Labium*: about as long as broad; orange with lighter tip. *Sternum* (Fig. 9F): orange, shiny. *Abdomen* (Fig. 9A): light yellowish with a shiny light orange scutum marked with orange-brown and a pair of scanty white haired spots on the sides. Spinnerets light yellowish. *Legs*: legs I (Fig. 9E): elongate with enlarged tibiae; ventral tibial fringe composed of brown-black lanceolate hairs; spines robust, socket flanges well developed; orange except for light yellowish tarsi. Remaining legs light yellowish with some blackish prolateral stripes. Spination: femora: I P 0–1–0, II–IV D 0–0–1; tibiae: I V 0–4–2, II V 1–0–0; metatarsi I V 0–2–2. *Palp* (Fig. 9B, E).

Dimensions (mm): total length 2·80; carapace length 1·30, breadth 0·90; abdomen length 1·50; eyes anterior row 0·72, middle row 0·67, posterior row 0·78; quadrangle length 0·51. *Ratios*: AM : AL : PM : PL :: 6·5 : 3 : 0·75 : 3; AL–PM–PL: 4–3·5.

VARIATION. Unknown.

DISTRIBUTION. Java.

MATERIAL EXAMINED. Lectotype ♂.

Marengo grammica (Simon) comb. nov.

(Fig. 10A–J)

Philates grammicus Simon, 1900 : 402, ♂, ♀. LECTOTYPE ♂ (here designated) Philippines, Manila, Quingua, Antipolo (MNHN, Paris) [Examined] Simon, 1901 : 488, 491, 493. Petrunkevitch, 1928 : 183. Roewer, 1954 : 938. Bonnet, 1958 : 3537. Prószyński, 1971 : 457.

DIAGNOSIS. *M. grammica* is a fairly distinctive species, which can be separated from other *Marengo* by the female abdominal stripes (Fig. 10B), epigyne (Fig. 10D, H, I) and the male palp (Fig. 10C, J). It resembles *M. inornata* (Simon) by having a short pedicel, but in other respects its affinities are uncertain.

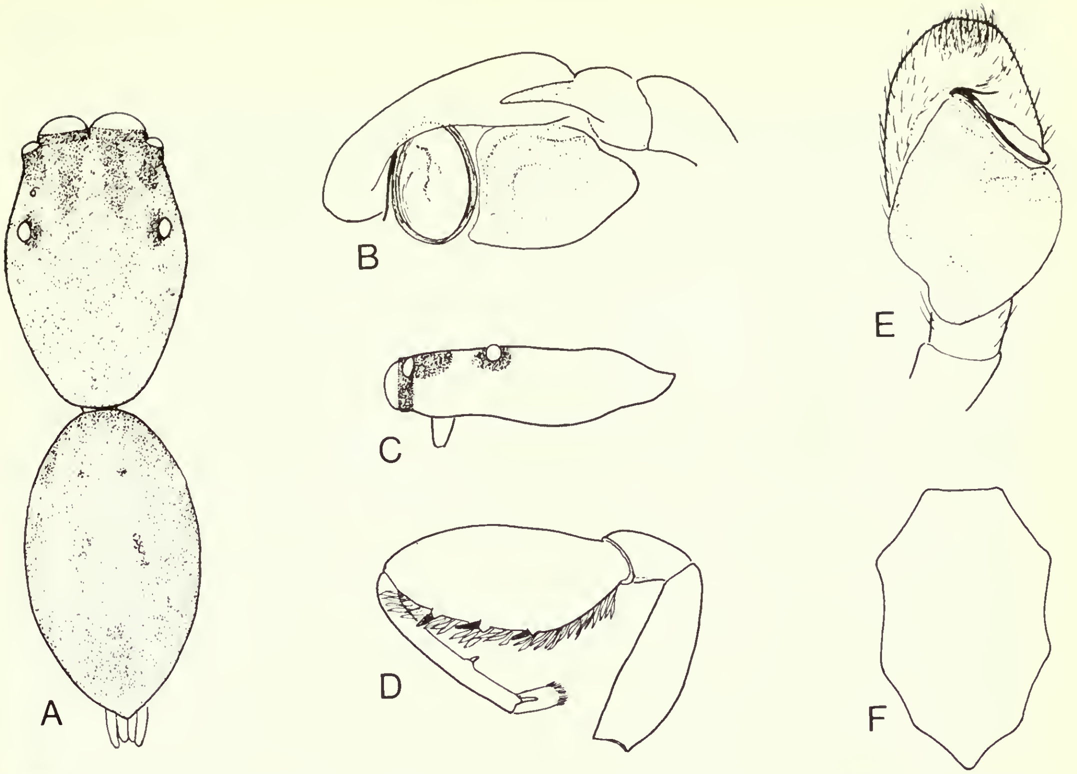

Fig. 9 *Marengo chelifer* Simon, lectotype ♂: (A) dorsal view; (B) palp, lateral view; (C) carapace, lateral view; (D) leg I; (E) palp, ventral view; (F) sternum.

Male lectotype. *Carapace* (Fig. 10A, I): eye region raised reticulate with setae grading to papillate-falsifoveate with setae on thoracic part; reddish brown with fine whitish setae and scanty white haired bands behind PL and on thoracic slope. *Eyes*: with black surrounds; anteriors contiguous with apices very slightly procurved, fringed with whitish hairs. *Clypeus*: very scantily fringed with fine whitish hairs. *Chelicerae*: small, more or less vertical, inner margins, slightly excavated; orange-brown; promargin with 3 teeth, retromargin with 4. *Maxillae*: blades convergent, more or less rounded with depressions (to accommodate swollen coxae); light orange-brown. *Labium*: slightly broader than long; dark orange-brown. *Pedicel*: short. *Abdomen*: yellow-brown lightly suffused with black, with entire dorsal scuta orange to dark orange, clothed with fine, clear whitish hairs. Spinnerets: posteriors black, medians and anteriors light yellow. *Legs*: legs I (Fig. 10E): massive, coxae, trochanters, femora, patellae and tibiae grossly enlarged; ventral tibial fringe composed of stiff brown-black hairs; spines slender, socket flanges not well developed; orange-brown, but tarsi and metatarsi lighter. Legs II–III light yellow, with blackish femoral markings. Legs IV as III but distal half of femora orange-brown. Spination: tibiae: I V 0–1–4, II V 0–1–0; metatarsi: I V 0–2–2. *Palp* (Fig. 10C, J): orange-brown with whitish yellow cymbium.

Dimensions (mm): total length 3·6; carapace length 1·78, breadth 1·22; abdomen length 1·82; eyes anterior row 1·08, middle row 0·96, posterior row 1·12; quadrangle length 0·74. *Ratios*: AM : AL : PM : PL :: 9·5 : 4·5 : 0·75 : 5; AL–PM–PL: 5–6.

Female paralectotype. Similar to male except for the following. *Carapace* (Fig. 10B): broader posteriorly. *Eyes*: anteriors more strongly procurved. *Chelicerae*: not excavated; promargin with 1 tooth retromargin with 3 or 4. *Abdomen* (Fig. 10B): scuta lacking; orange-brown with light yellowish stripes from mid region to spinnerets; clothed with fine short light orange hairs. *Legs*:

legs I enlarged; light yellowish orange with darker markings on tibiae and femora. Remaining legs light yellow-orange with prolateral stripes on all femora and patellae, and tibiae III–IV. Spination: femora: I D 0–0–2, II–IV D 0–0–1; tibiae: I V 1–2–2, II V 0–1–0; metatarsi: I V 0–1–0. *Epigyne* (Fig. 10D, G, H).

Dimensions (mm): total length 3·70; carapace length 1·68, breadth 1·10; abdomen length 2·10; eyes anterior row 1·0, middle row 0·90, posterior row 1·07; quadrangle length 0·70. *Ratios*: AM : AL : PM : PL :: 9 : 4 : 0·75 : 3·5; AL–PM–PL: 5–6·5.

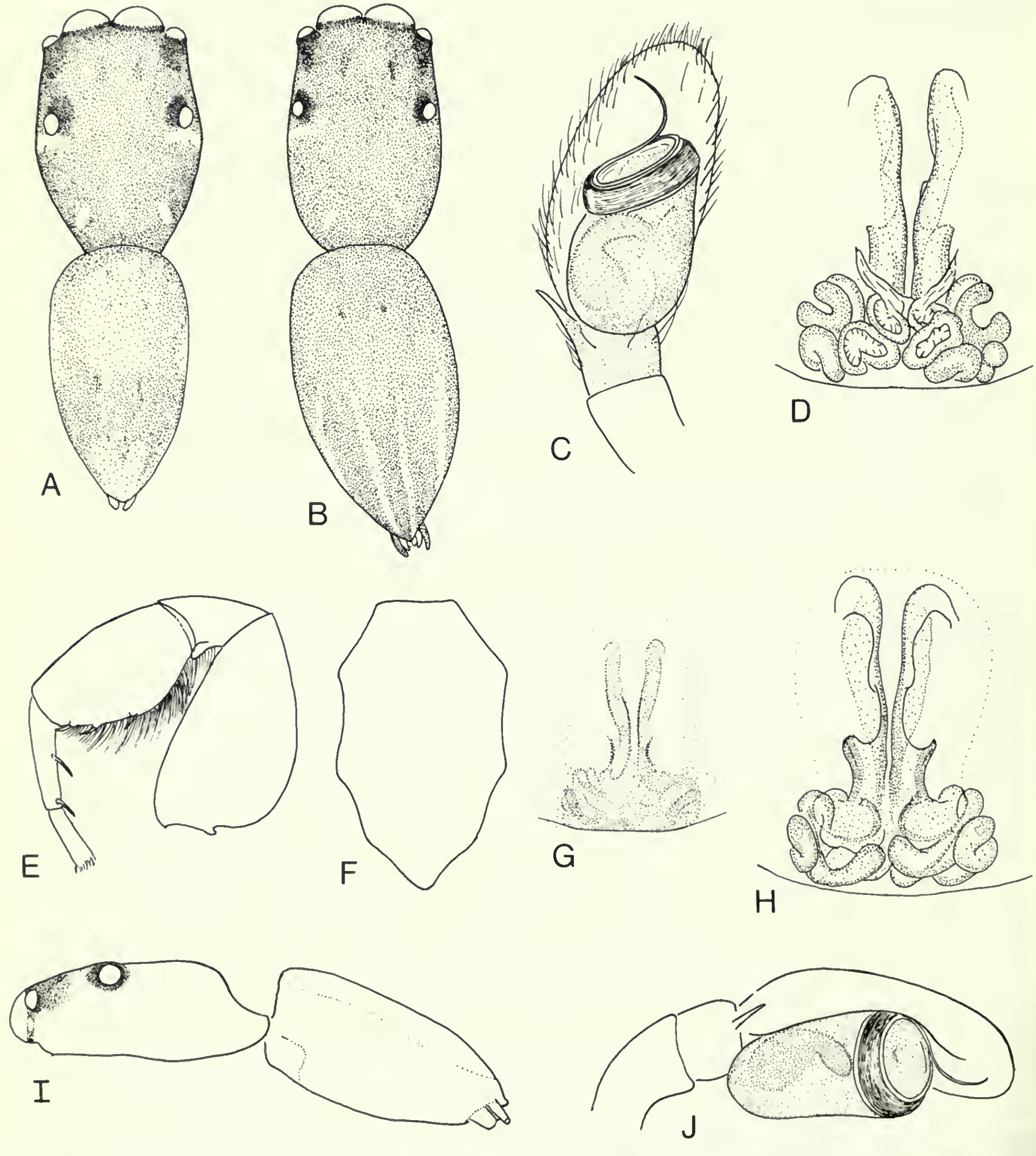

Fig. 10 *Marengo grammica* (Simon), lectotype ♂: (A) dorsal view; (C) palp, ventral view; (E) leg I; (F) sternum; (I) lateral view; (J) palp, lateral view. ♀: (B) dorsal view; (D) vulva, dorsal view; (G) epigyne; (H) vulva, ventral view.

VARIATION. Total length varies from 3·5 to 4·2 mm, carapace length 1·62–1·78 mm (three specimens). The outer abdominal stripes sometimes extend to anterior margin.

DISTRIBUTION. Philippines.

MATERIAL EXAMINED. Lectotype ♂ and three ♀ paralectotypes.

Acknowledgements

I wish to thank the following for providing specimens for this study: Professor P. L. G. Benoit, Musée Royal de l'Afrique Centrale, Tervuren (MRAC, Tervuren); M M. Hubert, Muséum National d'Histoire Naturelle, Paris (MNHN, Paris); Professor T. Kronestedt, Naturhistoriska Riksmuseet, Stockholm (NR, Stockholm); Professor H. W. Levi, Museum of Comparative Zoology, Harvard (MCZ, Harvard) and Dr A. de Barros Machado, Lisbon.

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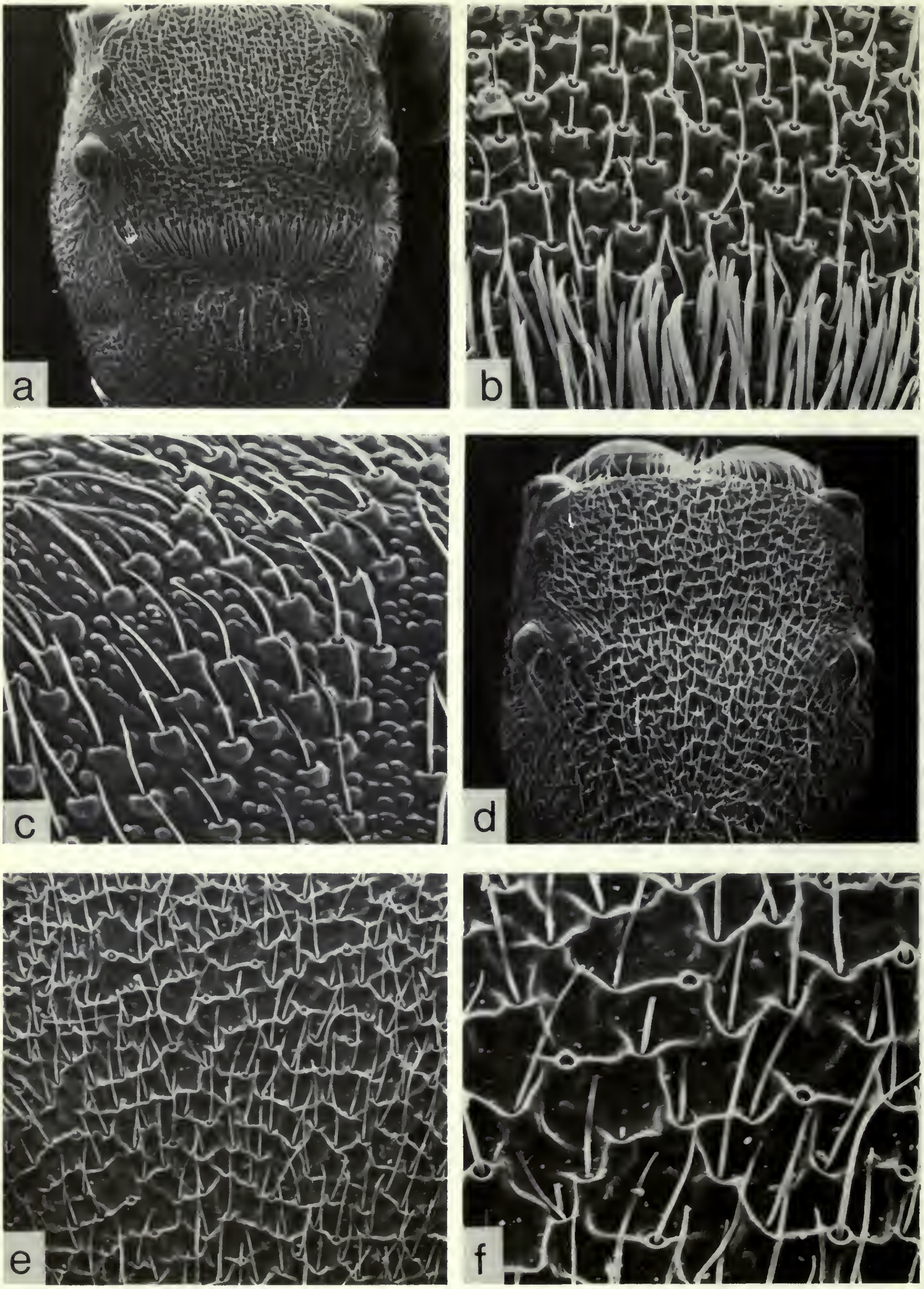

Plate 1 Scanning electron micrographs of cuticular sculpture. (a) *Marengo coriacea*, carapace. × 100. (b, c) *M. coriacea*, eye region and thoracic sides showing small papillae and larger piliferous papillae. × 500. (d) *Marengo crassipes*, carapace. × 100. (e, f) *M. crassipes*, eye region showing raised reticulate surface with setae. × 200 & × 500.

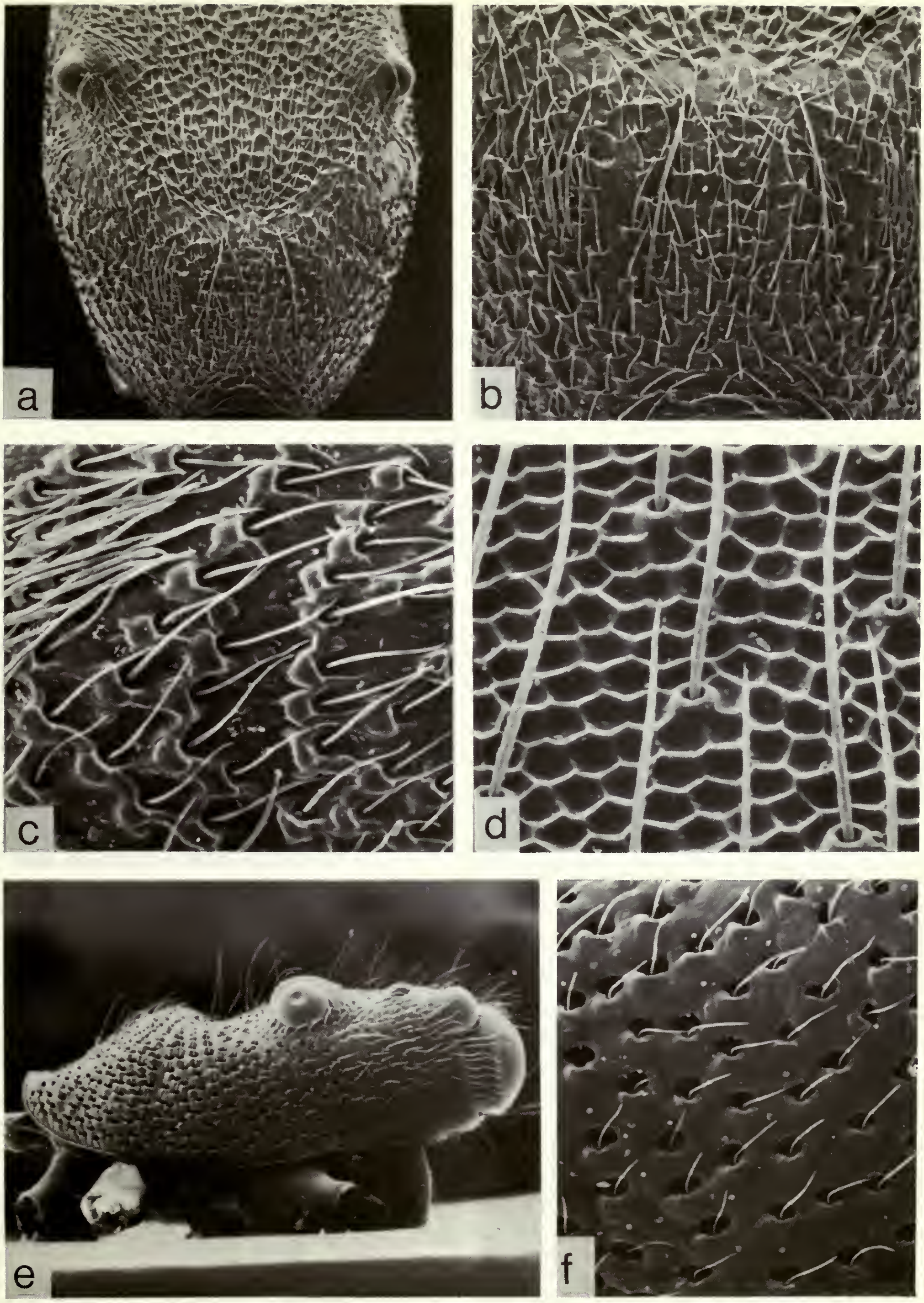

Plate 2 Scanning electron micrographs of cuticular sculpture. (a) *Marengo crassipes*, thoracic part. × 100. (b) *M. crassipes* thorax dorsal view, papillate-falsifoveate with setae. × 200. (c) *M. crassipes* thorax lateral view, papillate-falsifoveate with setae. × 500. (d) Example of punctured-reticulate sculpturing (*Myrmarachne marshalli* Peckham & Peckham). × 500. (e) *Marengo porosa* carapace, lateral view. × 50. (f) *M. porosa* cephalic area below PL showing perforations and setae. × 200.

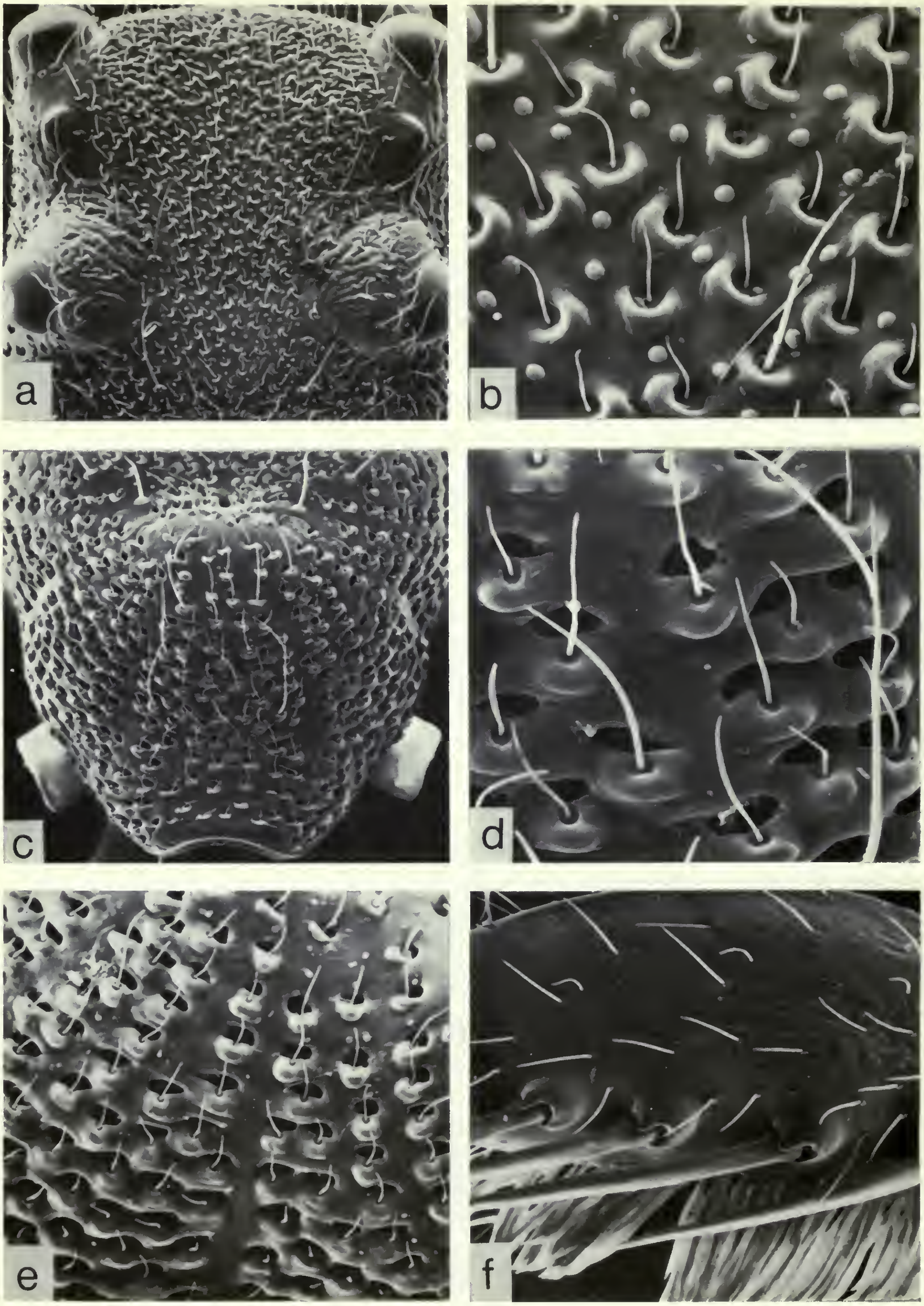

Plate 3 Scanning electron micrographs of *Marengo porosa*. (a, b) Eye region, dorsal view; papillate-falsifoveate with setae and scattered papillae. × 100 & × 500. (c–e) Thoracic part, dorsal view showing perforations and associated piliferous papillae. × 50, × 500 & × 200. (f) Leg I showing sockets with well-developed flanges. × 200.

A new species of *Steganacarus* (Acari, Cryptostigmata) from Israel

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Introduction

In connection with a computer study of phenetic affinity within the Phthiracaroidea, Sheals (1969) examined a small collection of phthiracarid mites collected by Dr M. Costa from bay litter (*Laurus nobilis*) in Upper Galilee, Israel. The material was found to contain several specimens of an undescribed and very distinctive species of the genus *Steganacarus* Ewing, characterized by the presence of an anterodorsal notogastral pouch. A series of scanning electron micrographs published later by Griffiths & Sheals (1971) illustrated certain aspects of the external morphology of this mite, a description of which is given below.

Family **PHTHIRACARIDAE** Perty, 1841

Steganacarus sacculiferus sp. nov.

Aspis (Figs 1–3): 242–463 μm long and with a greatest width of 206–370 μm. All the dorsal setae are fine, short and procumbent. The interlamellar (*il*) and lamellar setae (*la*) are more or less equal in length and form a transverse row behind which the prodorsal integument is raised into a number of longitudinal ridges. The sensillus is membranous, blunt distally and cranked near the base. Three finger-like tracheoles can be discerned below the bothridium and there is a single pair of short exobothridial setae (*ex*). In front of the *il–la* row there is a pronounced median keel and a pair of lateral keels. There is a distinct lateral ridge and a pronounced scale behind the bothridium. The aspal rim and the margins of the bothridial apertures are thickened. The integument is coarsely pitted around the bases of the keels and over the rostrum, but elsewhere it is finely punctate.

Notogaster (Figs 4 & 5; Pl. 1A & C): 535–1800 μm in length along a line through c_1 to h_1, and with a greatest depth of 329–741 μm. All the setae are short (less than the distance c_1–d_1), recurved and finely serrated (Pl. 1C). Vestigial f_1 is located just below h_1. The deep pouch located anterodorsally (generally filled with detritus) is partially overhung by a bilobed cowl which originates from the anterior limit of the notogaster and bears setae (c_1) paraxially (Pl. 1A). The notogastral integument is coarsely pitted posterolaterally, while anteriorly, and mid-dorsally in the area bounded by setae (e_1) and (h_1), the notogaster has no distinct ornamentation.

Ano-genital region (Figs 9 & 10; Pl. 1D): There are four pairs of marginal anal setae (an_{1-4}) and a single pair of adanal setae (*ad*) located submarginally. The genital setae (g_{1-9}) are minute and arranged in a pattern of 6+3 along the paraxial margins of the genital plates. A single aggenital seta *ag* is located antiaxially in the genital furrow. The integument of the anal and genital plates is distinctly pitted with the exception of the finely punctate setal-bearing areas. There are three pairs of genital papillae, the two anterior pairs bordering the ovipositor. The latter is trilobed. The ventral lobe is triangular in anterior view (Pl. 1D) and bears two pairs of setae distally (ψ_{1-2}), while the two laterodorsal lobes (indicated by the arrows in Fig. 10) are larger, compressed laterally and each bear seven setae (τ_{1-7}) antiaxially. The surfaces of the laterodorsal lobes are finely striated.

Infracapitulum: This is typically phthiracaroid in form (see for example, Macfarlane & Sheals, 1965). There are three pairs of adoral setae, the anterior pair being brush-like distally and the posterior two pairs weakly serrated.

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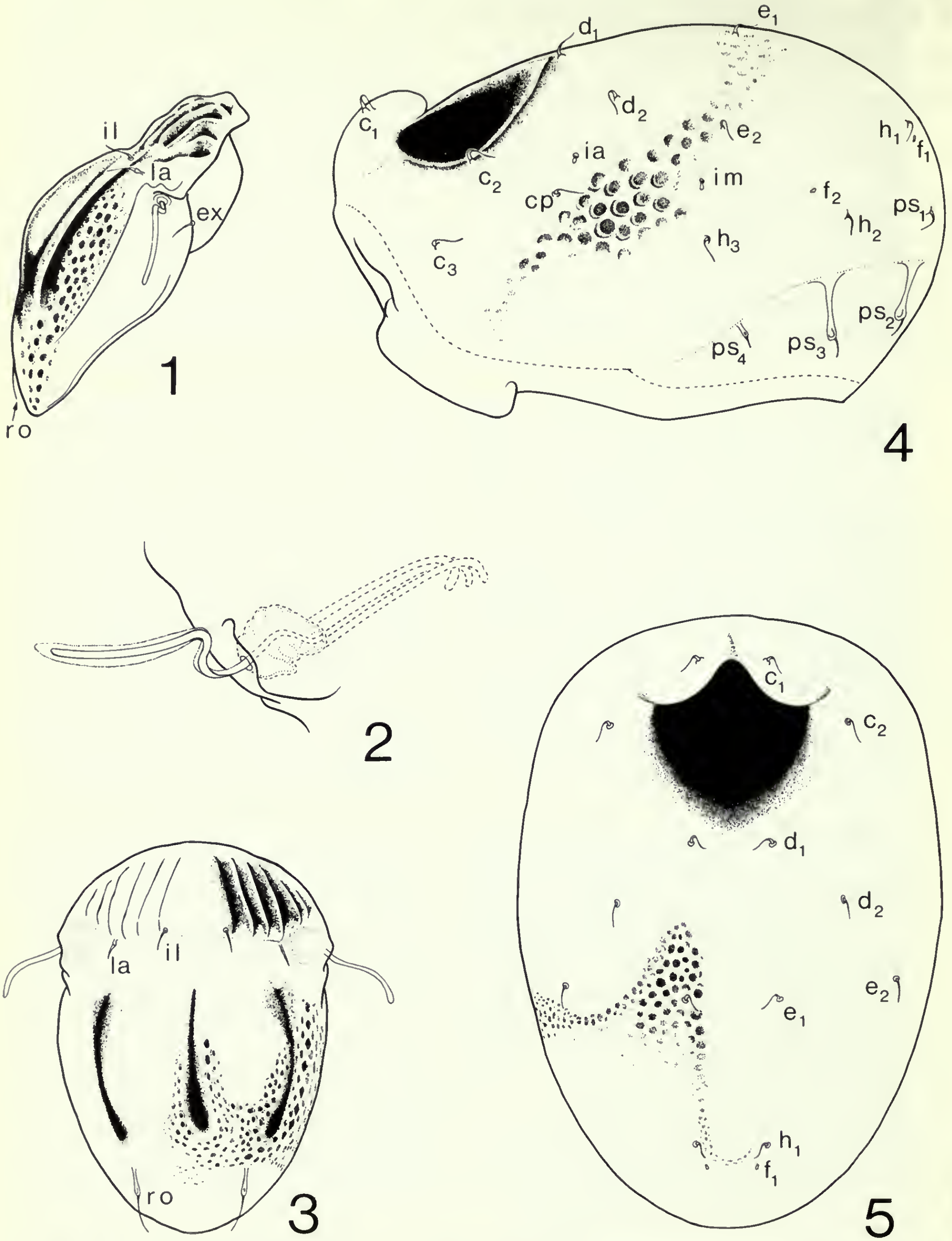
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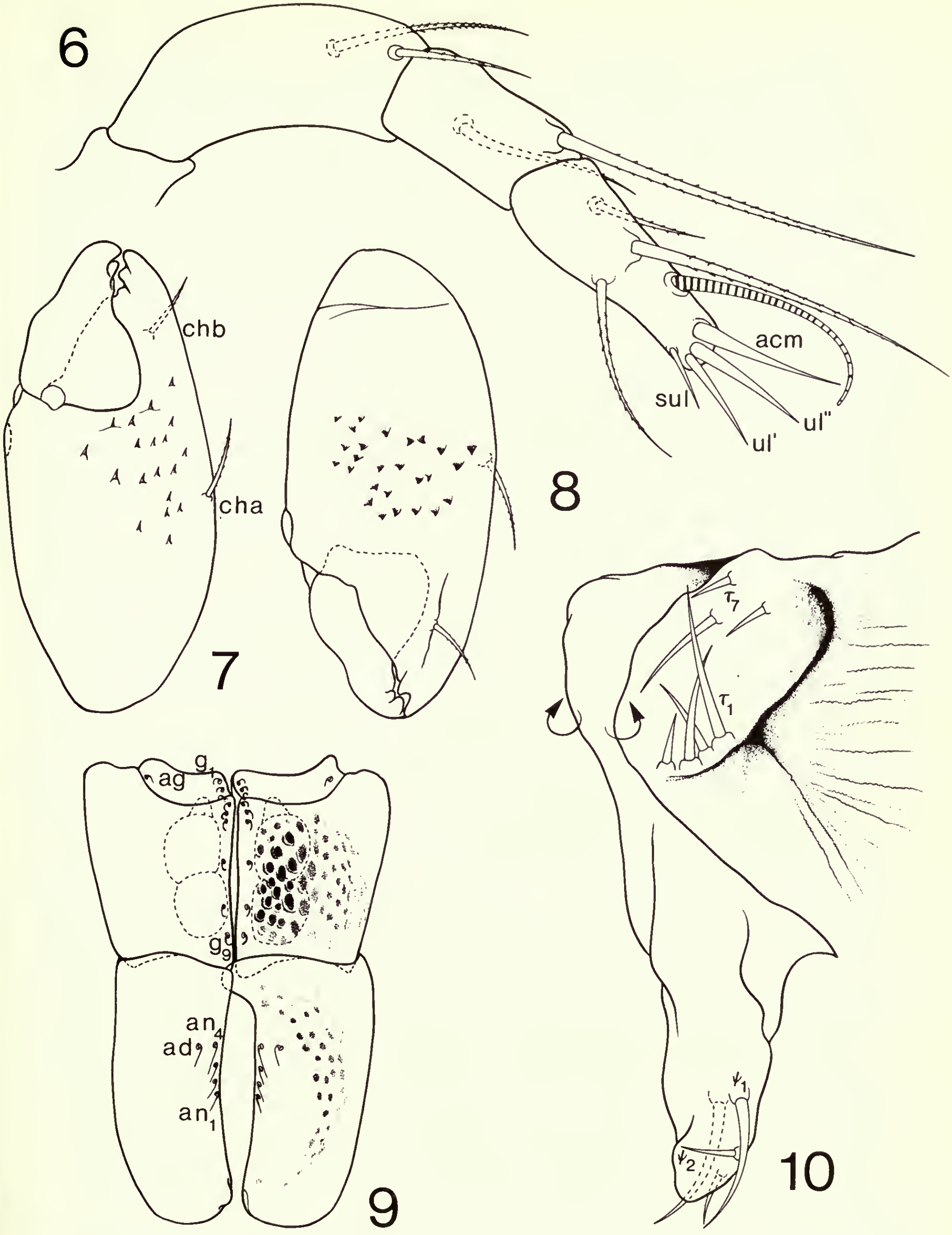
Figs 1–5 *Steganacarus sacculiferus:* (1) aspis, lateral; (2) sensillus and bothridium; (3) aspis, dorsal; (4) notogaster, lateral; (5) notogaster, dorsal.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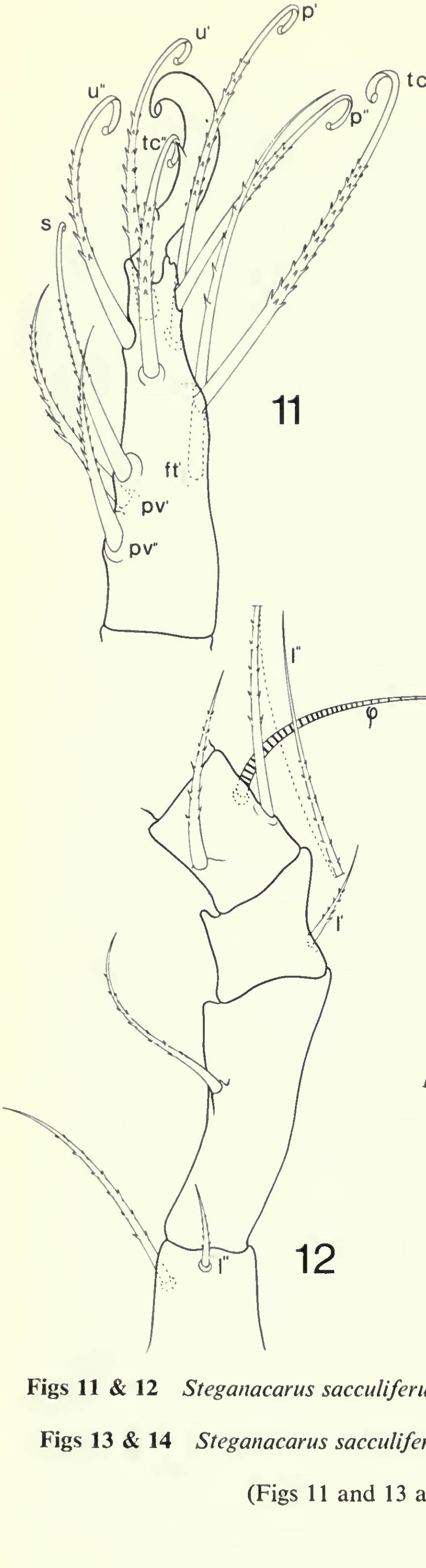
Figs 6–10 *Steganacarus sacculiferus:* (6) pedipalp; (7) chelicera, paraxial; (8) chelicera, antiaxial; (9) ano-genital region; (10) ovipositor, lateral.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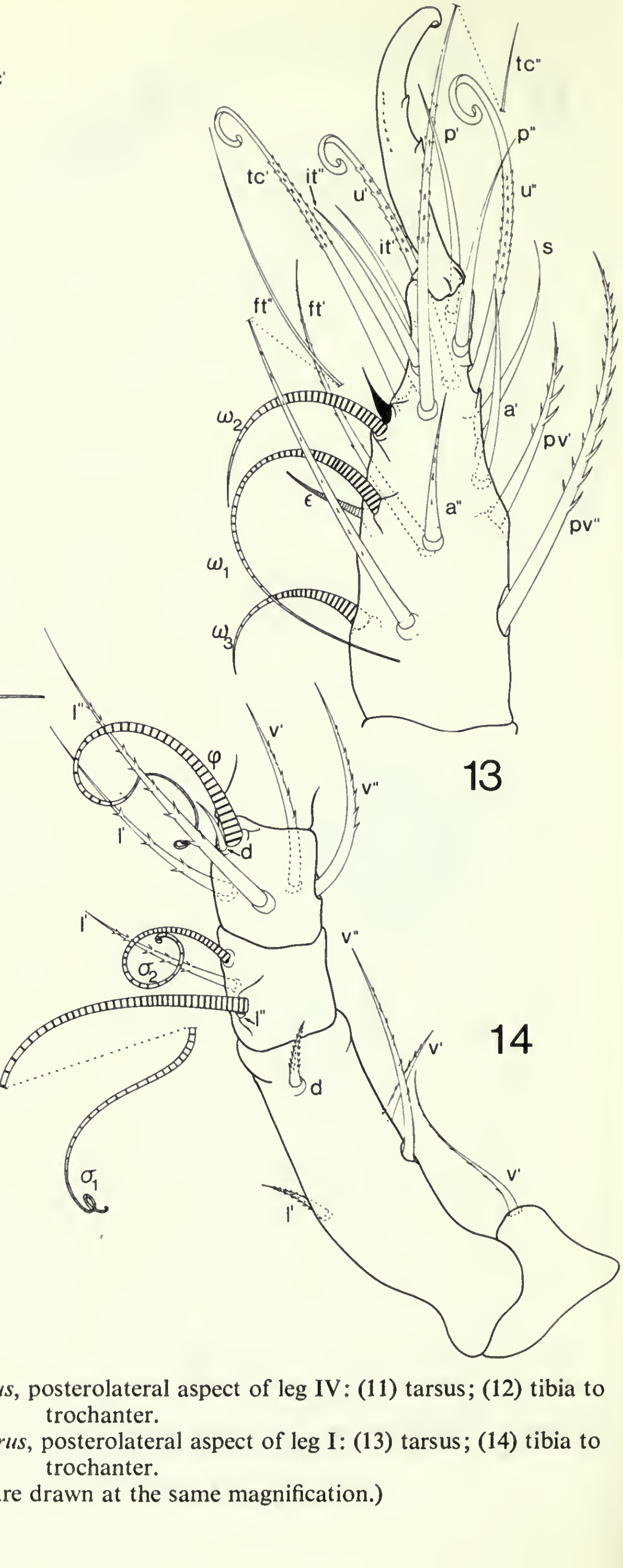
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Figs 11 & 12 *Steganacarus sacculiferus*, posterolateral aspect of leg IV: (11) tarsus; (12) tibia to trochanter.

Figs 13 & 14 *Steganacarus sacculiferus*, posterolateral aspect of leg I: (13) tarsus; (14) tibia to trochanter.

(Figs 11 and 13 are drawn at the same magnification.)

Pedipalps (Fig. 6): Three-segmented with the setal formula (2–2–7). Four of the tarsal setae (*acm*, *ul″*, *ul′* and *sul*) are eupathidial, *sul* being rather short (this seta is a minute spine-like process in species of *Hoplophthiracarus* and *Phthiracarus*).

Chelicerae (Figs 7 & 8): Both the fixed and the movable digits have two distinct teeth. The principal segment carries 17–29 conical spines on the antiaxial surface and 13–20 sharply pointed spines on the paraxial surface. This arrangement of cheliceral spines has also been observed in species of *Phthiracarus* but here the greatest number of spines is carried on the paraxial surface. Setae *cha* and *chb* are both serrated, *cha* being somewhat longer than *chb*. The latter is inserted on the antiaxial surface while *cha* is located dorsally. The cheliceral integument is punctate.

Legs (Figs 11–14; Pl. 1B, E & F): Legs II–IV are approximately equal in length while leg I is longer and more robust. The solenidial formulae for the legs are I (2–1–3); II (1–1–2); III (0–1–1) and IV (0–1–0). All the solenidia are long, usually with one or two coils distally. Solenidion ω_2 on tarsus I is coupled with a small distal seta (Pl. 1E). Such a setal/solenidial association was first described in *Hoplophthiracarus* (Macfarlane & Sheals, 1965) but has since been observed in a number of other phthiracaroid genera including *Neophthiracarus* (Sheals & Macfarlane, 1966), *Steganacarus* (Griffiths & Sheals, 1971) and *Phthiracarus* (Harding, 1976). The solenidion ϕ on tibia IV is free while on tibiae I–III it is closely associated with a dorsal seta *d*. The latter is comparatively long and rather prominent on tibia I but is much shorter on tibiae II and III. Solenidion σ_1 is coupled proximally with a minute lateral seta *l″* on genu I (Pl. 1F). The formulae for the leg setae are as follows: I (1–4–2–5–16–1); II (1–3–2–3–12–1); III (2–2–1–2–10–1) and IV (2–1–1–2–10–1). The famulus ε is short, rugose and closely associated with ω_1. Six of the setae on tarsus I ((*it*), (*p*), *s* and *a′*) are eupathidial. Seta *tc″* is comparatively long and straight (this seta is hooked in species of *Phthiracarus*). On all four tarsi setae (*ft*) and (*pv*) (together with *a″* on tarsi I and II) are more or less straight, circular in section and bear two or three rows of lateral serrations. The other tarsal setae (*tc′* and (*u*) on tarsus I and (*tc*), (*u*), (*p*) and *s* on tarsi II–IV) are ribbon-like, hooked distally and covered with whorls of spicules in the middle third (Pl. 1B). Seta *d* on femora I–III and seta *l″* on femur I are somewhat thickened and densely serrated. On all segments the lateral setae (*l*) bear several whorls of spicules in the middle third while the ventral setae (*v*) carry only two or three rows of serrations. All the tarsi terminate in a single claw bearing two ventral teeth and a row of serrations antero- and posterolaterally.

MATERIAL: Holotype, BMNH reg. no. 1977.2.11.1, and four paratypes, BMNH reg. no. 1977.2.11.2–5, all adults, from bay litter (*Laurus nobilis*), Upper Galilee, Israel. The material was collected by Dr M. Costa, 4 November 1968.

REMARKS: On the results of his study, Sheals (1969) suggested that certain species of *Steganacarus* (including *S. sacculiferus*, his number 17) might be classified with *Tropacarus* species to form a group all the members of which have 30 notogastral setae and an uncoupled solenidion on tibia IV. *S. sacculiferus* is unique amongst the known members of this ‘grouping’ by virtue of its large pouch located anteriorly on the dorsum of the notogaster. The anterior cowl, although reminiscent of that found in *Tropacarus pulcherrimus* (Berlese), is also unique in that its posterior margin is deeply divided. Moreover, although *S. sacculiferus* shows an overall similarity to *Steganacarus*, it has certain affinities with *Tropacarus*.

Species currently classified in *Tropacarus* Ewing are distinguished from those of *Steganacarus* by the presence of a narrow band of unsculptured notogastral integument extending mid-dorsally from the level of seta c_1 to seta ps_1. This band may be elevated to form a carina along the whole of its length as in *Tropacarus carinatus* (C. L. Koch) or the carina may be only developed posteriorly as in *Tropacarus brevipilus* (Berlese). The area of unsculptured integument mid-dorsally in *S. sacculiferus* (extending from the anterior limit of the notogaster to seta h_1) resembles that found in *Tropacarus*. Moreover, the genital setae of *S. sacculiferus* are in a pattern of 6+3 as in *Tropacarus* species, while the 5+4 arrangement is found in *Steganacarus*. The notogastral setae are comparatively short as in *Tropacarus* (for example, *T. carinatus*) but the general shape of the notogaster and the form of the integumental ornamentation are characteristic of *Steganacarus* species.

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Addendum

Since this manuscript went to press a paper by Mahunka has been published (30 September 1977) in which he describes *Steganacarus grandjeani* as a new species from Galilee, Israel. *S. grandjeani* is undoubtedly synonymous with *S. sacculiferus* and must therefore receive priority.

Reference

Mahunka, S. 1977. Neue und interessante Milben aus dem Genfer Museum XXVIII. Zwei neue Oribatiden-Arten (Acari) aus Israel. *Acarologia* **19** : 132–135.

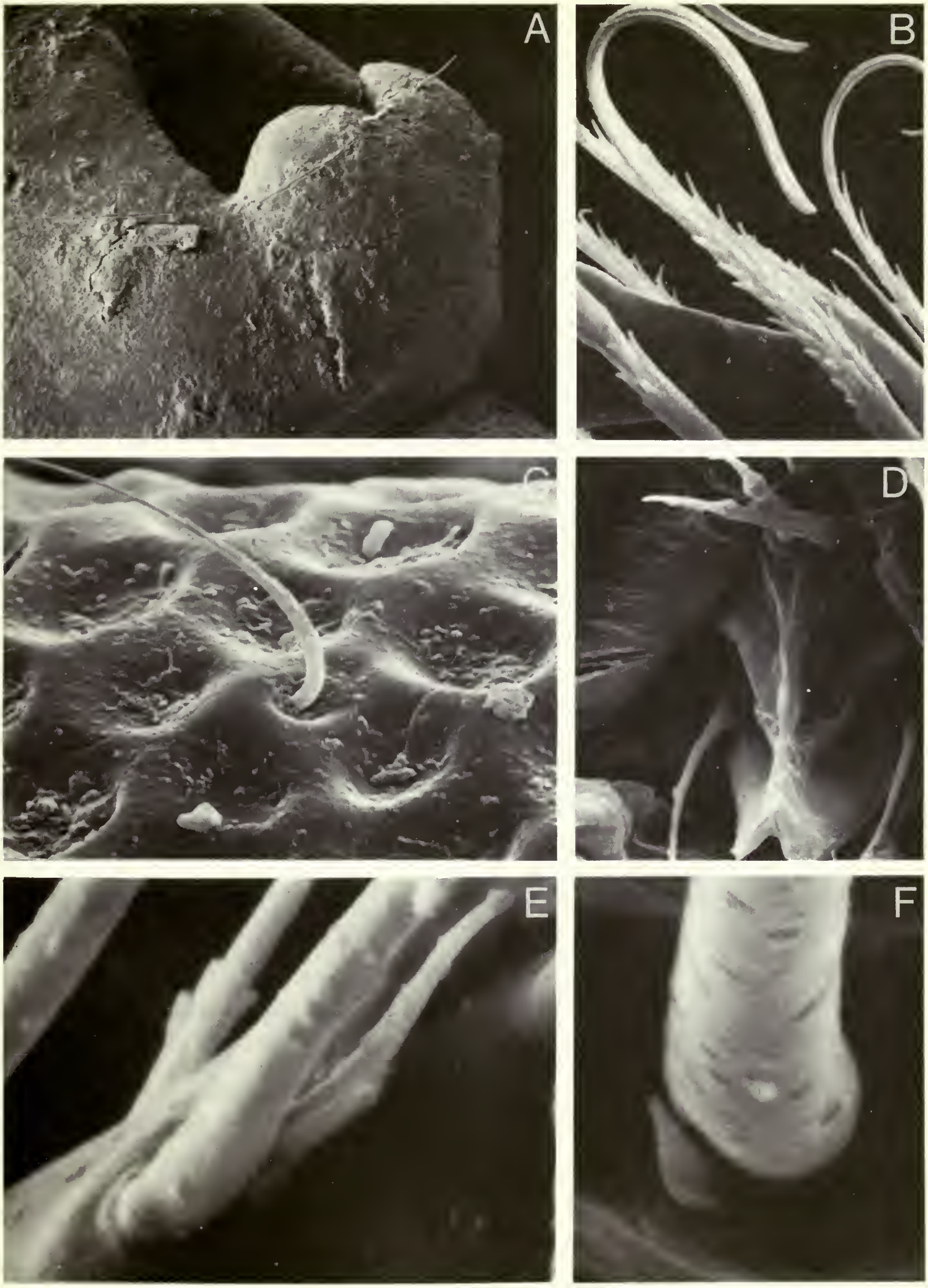

Plate 1 Scanning electron micrographs of *Stegnanacarus sacculiferus:* (A) notogastral pouch, laterodorsal aspect, × 200; (B) unguinial seta on tarsus II, × 1600; (C) detail of notogastral integument and seta, posterolateral aspect, × 1300; (D) ventral lobe of ovipositor, anterior aspect, × 1000; (E) distal solenidion and associated seta on tarsus I, posterolateral aspect, × 6000; (F) solenidion and associated seta on genu I, dorsal aspect, × 6000.

The larval development of the portunid crab *Macropipus pusillus* (Leach) reared in the laboratory

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Introduction

The larval stages of *Macropipus puber* (L.) and *M. holsatus* (Fabricus) were described by Rice & Ingle (1975b) and compared with those of *M. marmoreus* (Leach), the only other species of the genus for which detailed larval descriptions were previously available (see Goldstein, 1971). A number of small, but significant, differences between the larvae of the three species were recognized and it was anticipated that similar distinctions between the larvae of all *Macropipus* species would be found when they had been examined in sufficient detail. This paper describes the larvae of a fourth species, *M. pusillus* (Leach), and reviews the diagnostic larval characters within the genus which were discussed by Rice & Ingle (1975b).

Materials and methods

An ovigerous *Macropipus pusillus* was collected off Langness Point, Isle of Man, on 23 July 1975. Hatching began on 24 July at 15 °C and was completed by the following afternoon. Larvae were reared in compartmented plastic trays and in 'mass culture' vessels using the technique described by Rice & Ingle (1975a). Development took 39 days from the beginning of hatching to the appearance of the first crab stage. Larvae and moults were fixed and preserved in a solution of propylene phenoxetol, propylene glycol and formaldehyde as formulated by Steedman (1976 : 148). Drawings and measurements were made with the aid of a *camera lucida*.

The larvae and the adult female are deposited in the British Museum (Natural History), registration number 1976: 249.

Results

The five zoeal stages (I–V) and the megalopa of *M. pusillus* are illustrated in Figs 1–6. No detailed descriptions of these stages are given since the larval characters are generally very similar to those of the previously described *Macropipus* species. Instead, the larval stages of *M. pusillus* and of the other adequately described species, i.e. *M. marmoreus* (Goldstein, 1971) and *M. puber* and *M. holsatus* (Rice & Ingle, 1975b), are compared directly in Tables 1 & 2.

Discussion

The zoeae of *M. puber* can be readily distinguished from those of the other three species by the rather stout, straight and relatively long dorsal carapace spine. In *holsatus*, *marmoreus* and *pusillus* this spine is slender, curved and short. In the early stages the zoeae of *puber* are also much larger than those of the other three species, while from stage III *puber* is easily recognized by the reduction and ultimate loss of one of the three spines on each telson fork.

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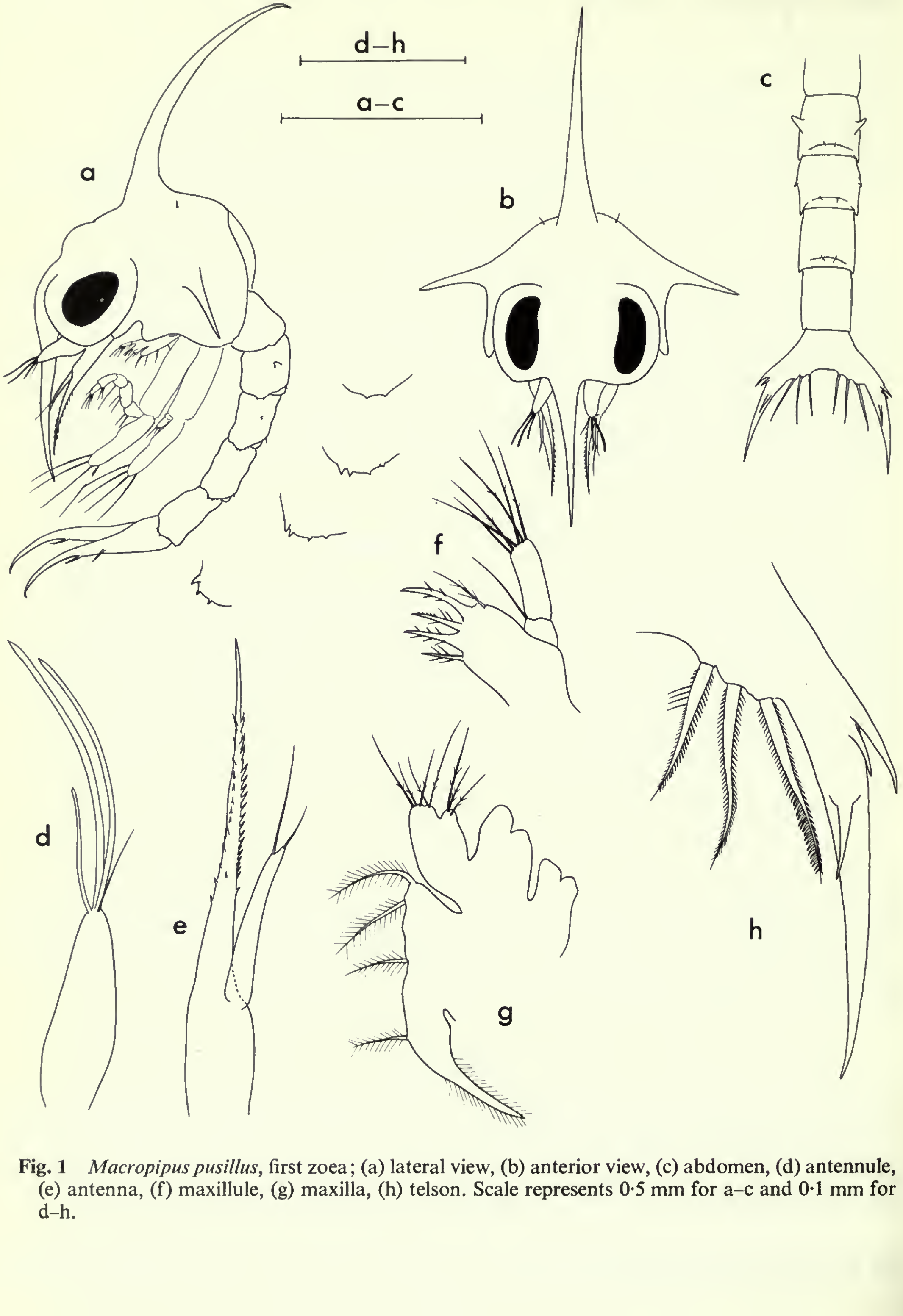

Fig. 1 *Macropipus pusillus*, first zoea; (a) lateral view, (b) anterior view, (c) abdomen, (d) antennule, (e) antenna, (f) maxillule, (g) maxilla, (h) telson. Scale represents 0·5 mm for a–c and 0·1 mm for d–h.

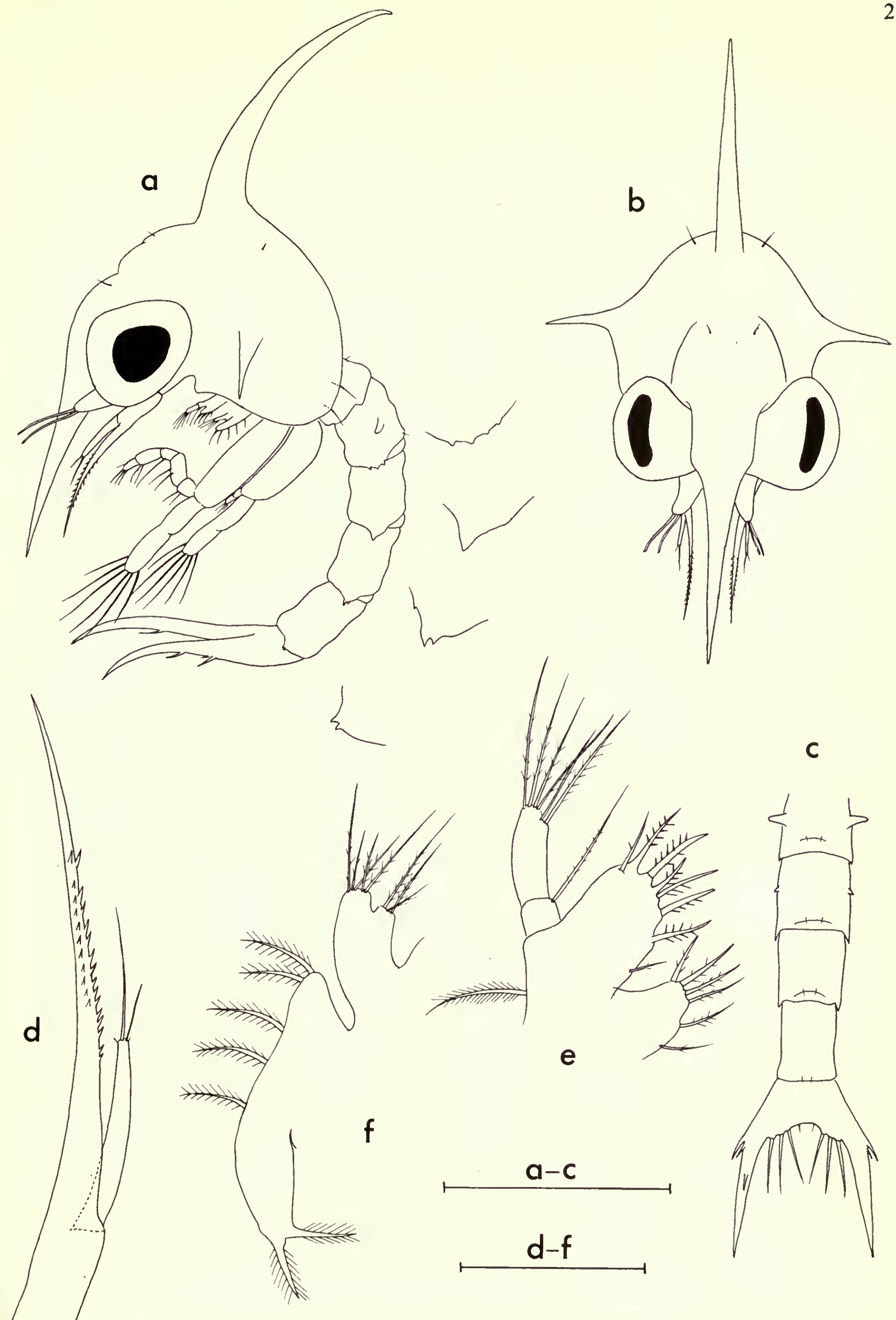

Fig. 2 *Macropipus pusillus*, second zoea; (a) lateral view, (b) anterior view, (c) abdomen, (d) antenna, (e) maxillule, (f) maxilla. Scale represents 0·5 mm for a–c and 0·1 mm for d–f.

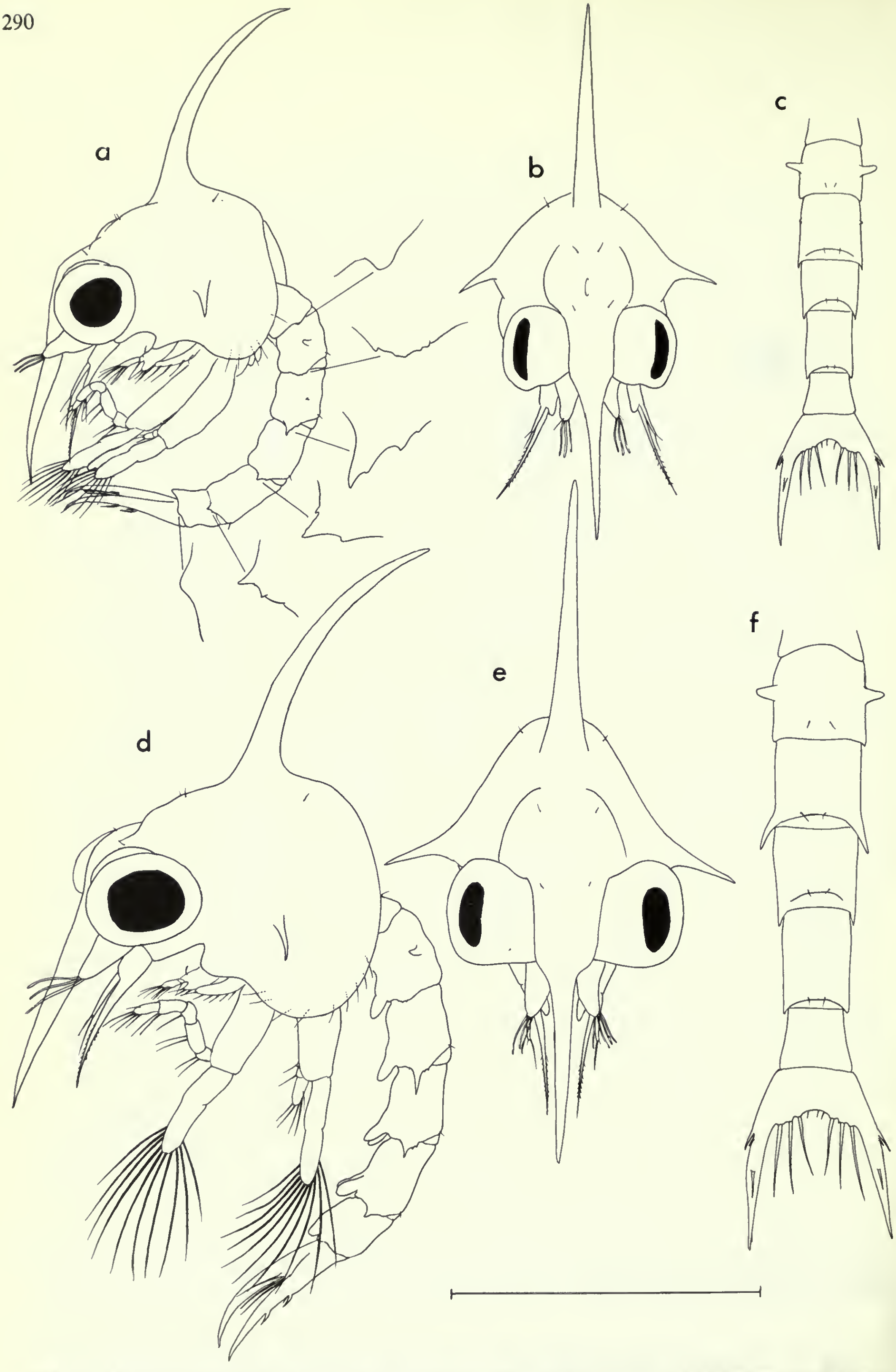

Fig. 3 *Macropipus pusillus;* (a), (b) and (c) lateral view, anterior view and abdomen, third zoea; (d), (e) and (f) lateral view, anterior view and abdomen, fourth zoea. Scale represents 1·0 mm.

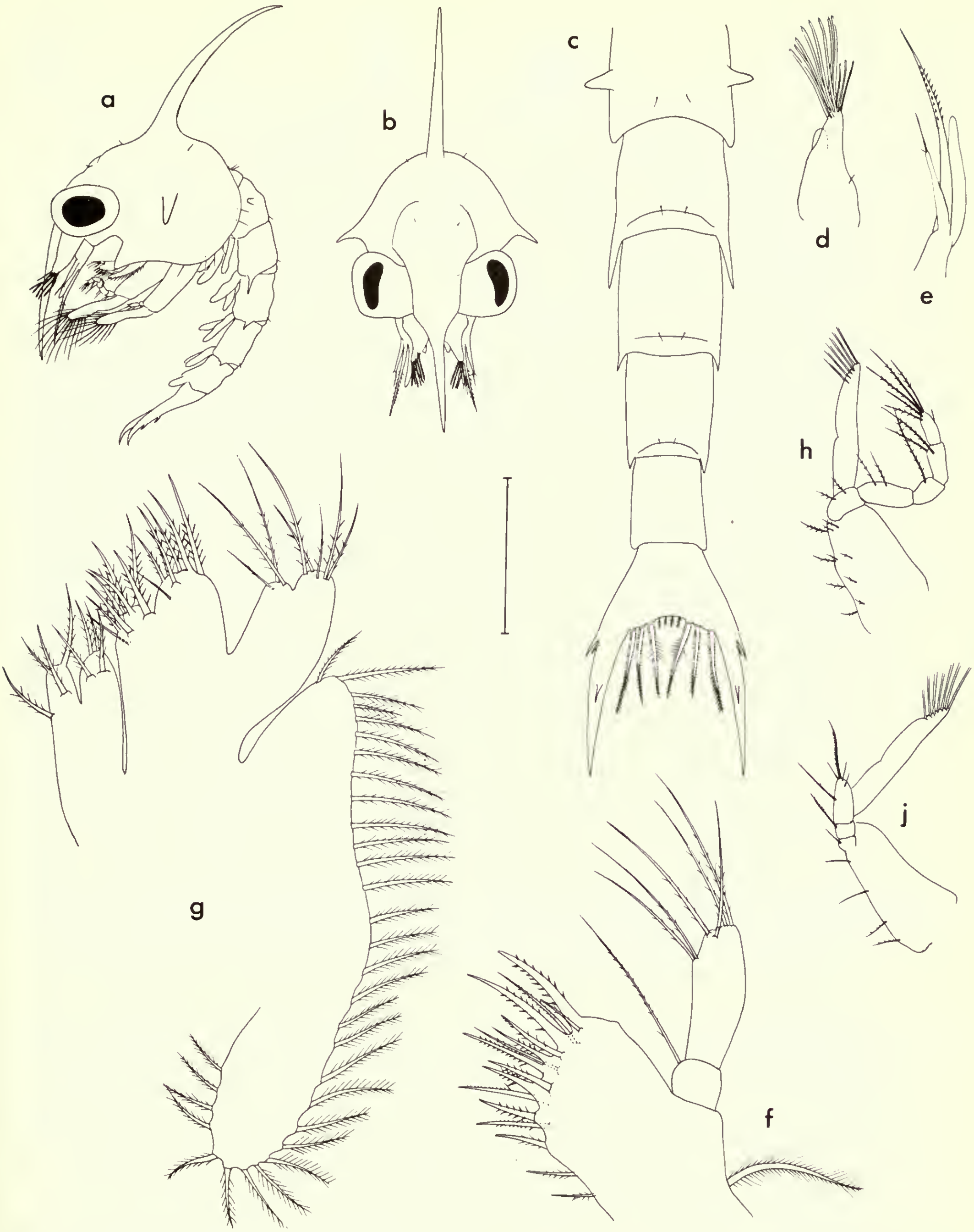

Fig. 4 *Macropipus pusillus*, fifth zoea; (a) lateral view, (b) dorsal view, (c) abdomen, (d) antennule, (e) antenna, (f) maxillule, (g) maxilla, (h) first maxilliped, (j) second maxilliped. Scale represents 1·0 mm for a and b, 0·1 mm for f and g and 0·4 mm for the remainder.

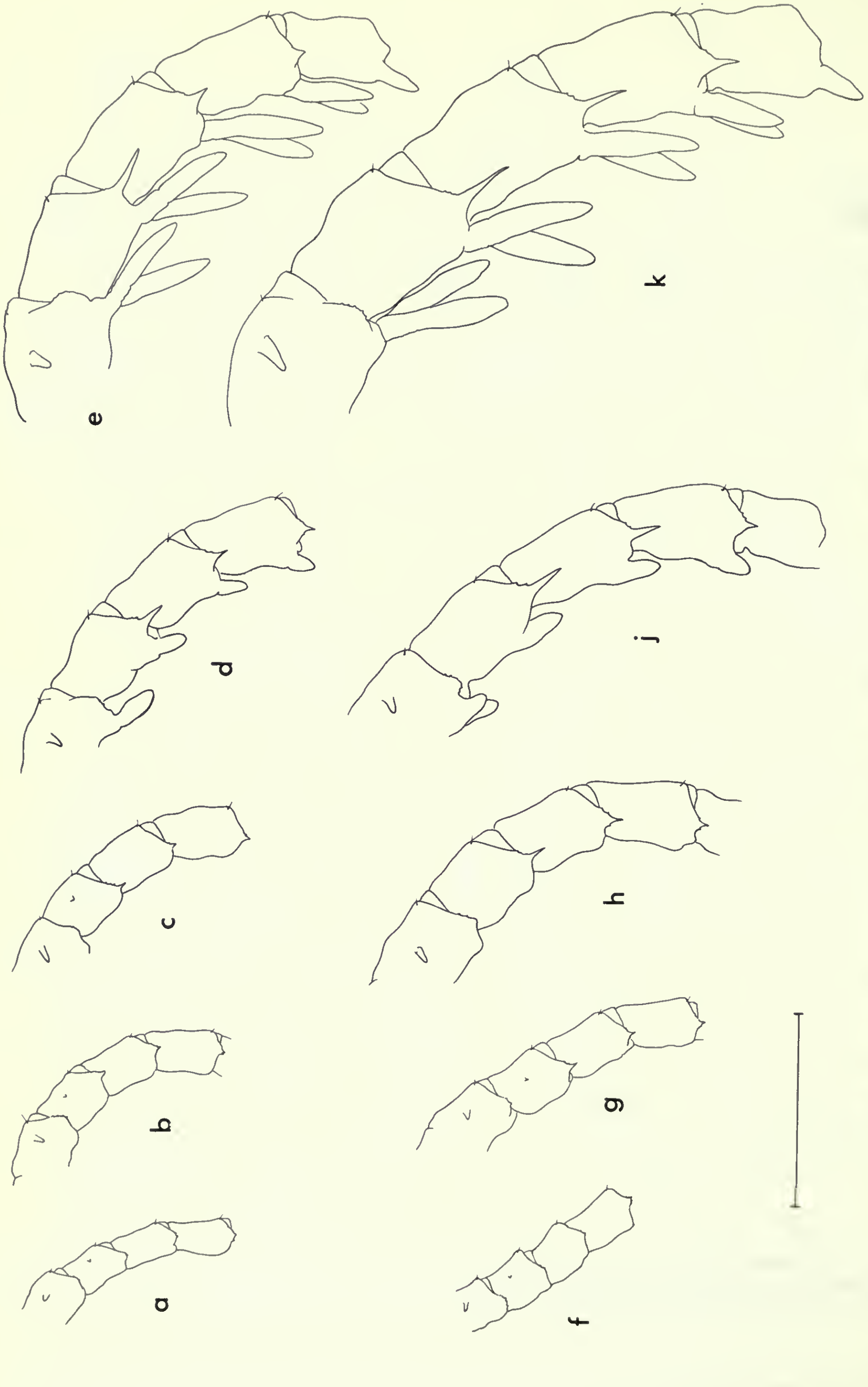

Fig. 5 *Macropipus pusillus* (a–e) and *M. holsatus* (f–k); lateral view of abdomens of first to fifth zoeae respectively. Scale represents 0·5 mm.

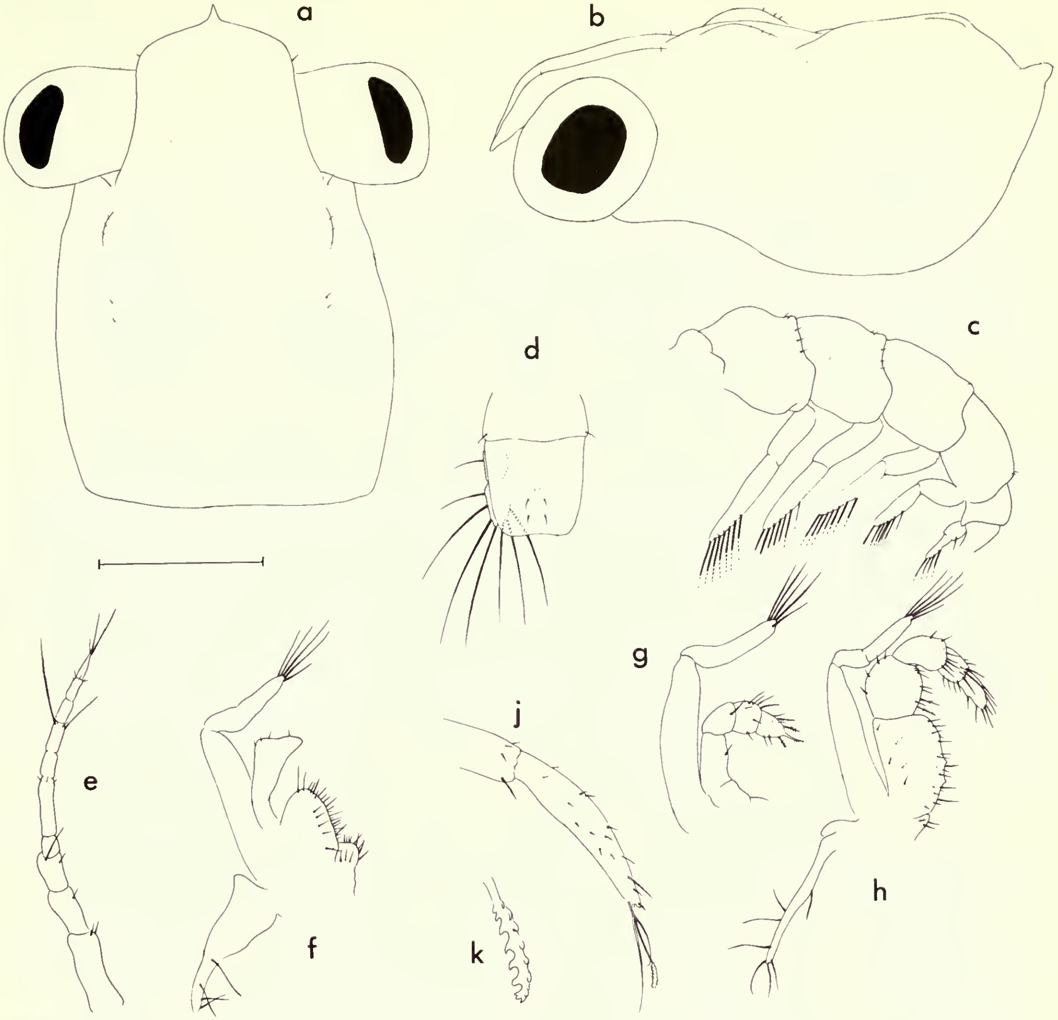

Fig. 6 *Macropipus pusillus*, megalopa; (a) carapace, dorsal view, (b) lateral view, (c) abdomen, (d) telson, (e) antenna, (f), (g) and (h) first, second and third maxillipeds, (j) dactyl of fifth pereiopod, (k) tip of sensory seta. Scale represents 0·5 mm for a–j and 0·1 mm for **k**.

There is, however, no single feature, by which all stages of *holsatus*, *marmoreus* and *pusillus* can be separated and different characters must therefore be used at different stages of development. Thus, from stage III *pusillus* is significantly smaller than either of the other species, while in stages III–V the posterio-lateral processes on the abdominal somites are poorly developed in *pusillus*, moderately developed in *holsatus* and prominent in *marmoreus*, In stage III the lateral process on the third abdominal somite is *present* only in *pusillus*, while in stage II it is *absent* only in *marmoreus*. In stages I and II the length of the antennal spinous process, relative to the rostrum, is much less in *marmoreus* than in either *holsatus* or *pusillus*, and *marmoreus* also has fewer setae on the basipodite of the first maxilliped.

Finally, zoeal stages I and II of *holsatus* and *pusillus* are very difficult to separate. In stage II the only difference noted was the presence of 8 marginal setae on the scaphognathite in *pusillus* compared with 11 in *holsatus*. In the first zoeal stage a pair of anterior and posterior carapace setae are present in *holsatus*, but the anterior pair could not be detected on *pusillus* and, if present, must be considerably smaller than those of *holsatus*.

Table 1 Comparison of the zoeal stages of *Macropipus puber*,[1] *holsatus*,[1] *marmoreus*[2] and *pusillus*

	M. puber	*M. holsatus*	*M. marmoreus*	*M. pusillus*
Stage I (Figs 1 and 5)				
Dorsal carapace spine (also in later stages)	Stout, straight	Slender, curved	Slender, curved	Slender, curved
Tip of dorsal to tip of rostral spine (mm)	1·90–2·20	1·10–1·30	1·10–1·24	1·18–1·34
Anterior carapace setae	Present	Present	?	Absent
Posterior carapace setae	?	Present	?	Present
Antenna: spinous process	<3/4 rostrum	>3/4 rostrum	<3/4 rostrum	>3/4 rostrum
First maxilliped: basipodite setae	10	10	6	10
Stage II (Figs 2 and 5)				
Tip of dorsal to tip of rostral spine (mm)	2·20–2·50	1·40–1·60	1·40	1·43–1·58
Antenna: spinous process	<3/4 rostrum	>3/4 rostrum	<3/4 rostrum	>3/4 rostrum
First maxilliped: basipodite setae	10	10	8	10
Maxilla: scaphognathite marginal setae	11	11	11	8
Abdominal somite 3: lateral process	Present	Present	Absent	Present
Abdominal somites 3–5: posterio-lateral margins	Not prominent, none more than 1/4 length of succeeding somite	As *puber*	Prominent, those of somite 3>1/4 length of somite 4	As *puber*
Stage III (Figs 3 and 5)				
Tip of dorsal to tip of rostral spine (mm)	3·00–3·30	1·90–2·20	1·70	1·66–1·76
Abdominal somite 3: lateral process	Absent	Absent	Absent	Present
Abdominal somites 3–5: posterio-lateral margins	Short, those of somites 3 & 4 <1/4 length of succeeding somites	Long, those of somites 3 & 4 >1/4 length of succeeding somites	Long, those of somite 3 *c.* 1/3 length of somite	Short, those of somites 3 & 4 <1/4 length of succeeding somites
Telson fork spines	Usually 2	3	3	3
Telson posterior marginal setae	4 pairs	4–5 pairs	5 pairs	4 pairs
Stage IV (Figs 3 and 5)				
Tip of dorsal to tip of rostral spine (mm)	3·40–3·60	2·60–2·90	2·00	2·11–2·25
Abdominal somite 3: posterio-lateral margin	*c.* 1/4 somite 4	1/3–1/2 somite 4	>1/2 somite 4	*c.* 1/3 somite 4
Abdominal somite 4: posterio-lateral margin	*c.* 1/4 somite 5	>1/3 somite 5	*c.* 1/3 somite 5	<1/3 somite 5
Telson fork spines	2	3	3	3

---

[1] Data from Rice & Ingle (1975b), and a re-examination of the material.
[2] Data from Goldstein (1971).

Table 1 (*cont.*)

	M. puber	*M. holsatus*	*M. marmoreus*	*M. pusillus*
Stage V (Figs 4 and 5)				
Tip of dorsal to tip of rostral spine (mm)	3·80–4·10	3·00–3·50	3·70	2·54–2·78
Abdominal somite 3: posterio-lateral margin	< 1/3 somite 4	*c.* 1/2 somite 4	> 1/2 somite 4	1/3–1/2 somite 4
Abdominal somite 4: posterio-lateral margin	*c.* 1/3 somite 5	1/3–1/2 somite 5	> 1/3 somite 5	< 1/4 somite 5
Abdominal somite 5: posterio-lateral margin	< 1/4 somite 6	*c.* 1/3 somite 6	*c.* 1/3 somite 6	< 1/4 somite 6
Telson fork spines	2	3	3	3

In an earlier paper Rice & Ingle (1975b) mistakenly suggested that the absence of the posterior pair of dorsal setae might be one of the distinguishing features of larvae belonging to the subfamily Portuninae, since in the larvae of *M. puber* and *M. holsatus* (Polybiinae) and in *Carcinus maenas* and *C. mediterraneus* (Carcininae) (see Rice & Ingle, 1975a) only a pair of anterior dorsal setae had been reported. On re-examination, however, the zoeae of *M. holsatus* were all found to have both an anterior and a posterior pair of setae and the proposal has proved to be unfounded.

Rice & Ingle (1975b) found differences between the megalopae of *M. puber*, *holsatus* and *marmoreus* in the form of the antenna, the telson, the dactyl of the fifth pereiopod, and in the setation of the uropods. These same features can be used to distinguish the megalopa of *M. pusillus* (see Table 2).

Table 2 Comparison of the megalopa stages of *Macropipus puber*, *holsatus*, *marmoreus* and *pusillus*

	M. puber	*M. holsatus*	*M. marmoreus*	*M. pusillus*
Carapace length (mm)	1·66–2·09	1·86–2·16	*c.* 2·0	1·67–1·93
Antennal flagellum	Seven segments, the fifth bearing 2 long setae	Eight segments	Six segments, the long setae on the third	Seven segments, the long setae on the fourth
Dactyl of fifth pereiopod	Length > 5 times maximum width. Sensory setae clearly subterminal	Length *c.* 4 times maximum width. Sensory setae almost terminal	As holsatus	Length *c.* 5 times maximum width. Sensory setae almost terminal
Telson, dorsal setae	3 pairs	2 pairs	4 pairs	2 pairs
Exopods of uropods, marginal setae	8–10	9 or 10	8	7 or 8
Exopods of pleopods on somites 2–5, marginal setae	17–19, 16–19, 17–18, 13–15	17–20, 19–20, 18–19, 14–16	?	14–17, 14–16, 13–15, 12–14

With the description of the development of *M. pusillus*, the larval morphology of half the British species of this genus is now known in considerable detail. The difficulties experienced in distinguishing between the larvae of the four described species, particularly in the early stages, may indicate the need for an even more detailed study if all species of the genus are to be recognized through all the larval stages.

Acknowledgements

We wish to thank Dr A. Fincham for collecting the ovigerous female of *M. pusillus* and Mr J. F. Peake for suggesting improvements to the manuscript.

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A review of the pharyngeal apophysis and its significance in the classification of African cichlid fishes

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Contents

Synopsis . . . 297
Abbreviations used in text figures . . . 297
Introduction . . . 298
The structure and morphology of the apophysis . . . 299
  Tylochromis type . . . 299
  Tilapia type . . . 301
  Tropheus type . . . 302
  Haplochromis type . . . 303
  Discussion . . . 305
A review of apophyseal structure in the African cichlid genera . . . 305
Lake Tanganyika . . . 306
Lake Malawi . . . 313
Lake Victoria . . . 318
Riverine genera . . . 318
Discussion and conclusions . . . 321
Acknowledgements . . . 322
References . . . 322

Synopsis

Ethological evidence has cast some doubts on the phylogenetic validity of the tacitly accepted division of African cichlid genera into '*Haplochromis*' and '*Tilapia*' groups. This paper reviews the structure and morphology of the pharyngeal apophysis, the skull character on which the original two-group hypothesis was formulated. The revision shows that many of the original '*Tilapia*' group genera have a distinct apophyseal form and structure (the *Tropheus* type) which at least in some structural features, shows greater affinity with the '*Haplochromis*' type than with the '*Tilapia*' one, and that a fourth type (the '*Tylochromis*' one) must also be recognized. The only formally proposed subfamilial classification of African, Asian and American cichlids was based on the pharyngeal apophysis and must now be rejected.

Abbreviations used in text figures

b.	Basioccipital buttress overlying parasphenoid
bc.	Articular surface for first vertebra
boc.	Basioccipital
bocf.	Facet-like region on basioccipital
boc r-f.	Ridge-like facet on basioccipital
bof.	Articular facet on basioccipital process
bop.	Ventrally directed basioccipital process
exo.	Exoccipital
my.	Myodomal groove in basioccipital
pro.	Prootic
ps.	Parasphenoid
psf.	Articular facet, or region, on parasphenoid
s.	Sutural surface interdigitating with the s_1 process of parasphenoid

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Bull. Br. Mus. nat. Hist. (Zool) **33** (5): 297–323

Issued ~~30 March 1978~~
27 April 1978

s_1	Process of parasphenoid which interdigitates with s region of basioccipital
sg.	Saccular groove
sgs.	Septum between saccular groove of each side

Introduction

Regan's now classic papers of 1920 and 1922 not only provided the first critical analysis of the African cichlid genera, but also appeared to offer a phylogenetic basis for their intrafamilial classification.

Using certain characteristics of the neurocranial apophysis with which the upper pharyngeal bones articulate (see p. 299), Regan brought together the genera into a *Tilapia* and a *Haplochromis* lineage, the lineages taking their names from the two genera whose apophyseal characters supposedly typified those of the related taxa contained in each group (Regan, 1920).

Some years later, Trewavas (1935), in a revision of the Lake Malawi cichlids, made a few slight modifications to Regan's basic scheme. As a result certain genera were reallocated, but the basic two-lineage concept remained.

Because subsequent workers were concerned mainly with revisions at the generic and specific levels (often paying scant attention to apophyseal characters), Regan's original division of the Cichlidae continued to be accepted, albeit informally as far as any higher classification was concerned, but still with implicit phyletic overtones.

In 1947, Hoedeman gave the two groups formal status by designating them as the subfamilies Tilapinae and Haplochrominae (see also Hoedeman, 1974). Hoedeman recognized a third subfamily, the Etroplinae (for the Asian genus *Etroplus* and the Malagasian genus *Paretroplus*), but did not discuss the nature of the pharyngeal apophysis in its constituent taxa, nor did he describe any but the most superficial of their anatomical features. This classification, put forward in handbooks written for aquarists, has been generally overlooked, or at least not utilized in the primary ichthyological literature.

The first serious doubts as to the phylogenetic validity of Regan's (1920) *Tilapia* and *Haplochromis* divisions were expressed by Wickler (1963), an ethologist studying the breeding behaviour of Lake Tanganyika cichlids. Wickler found that *Tropheus moorii*, a supposed member of the *Tilapia* lineage had, in fact, a typical *Haplochromis* type of breeding behaviour, a behaviour pattern associated with the presence of certain male secondary sexual characters (the anal ocelli) which are absent in species of the genus *Tilapia* (and in the closely related genus *Sarotherodon*). Wickler also suggested, but without experimental evidence, that the affinities of at least one other Tanganyika genus (*Petrochromis*) had been misinterpreted by Regan.

The uncertainty generated by Wickler's discovery was compounded by Trewavas' view (quoted in Burchard & Wickler, 1965) that *Tropheus moorii* did indeed have a *Haplochromis* type of pharyngeal apophysis and not, as Regan described it, one of the *Tilapia* type. As will be apparent later, I do not agree with either Trewavas or Regan on this point; *Tropheus* has neither a *Tilapia* nor a *Haplochromis* apophysis but represents a third apophyseal morphotype (see p. 302).

Fryer & Iles (1972 : 502–504), impressed by Wickler's findings, expressed their doubts regarding the value of the apophysis as an indicator of relationships in quite unequivocal terms, although they do not appear to have made a detailed examination of this structure themselves. In their opinion (Fryer & Iles, 1972 : 503), Regan gave too little weight to the phyletic value of other similarities shared by taxa whose apophyseal features placed them in different lineages. But, before the phyletic implications of these characters are accepted they will have to be subjected to a more detailed and critical analysis than was afforded them by Fryer & Iles in their proposed phylogenies of various Lake Tanganyika generic groups (1972 : 507, fig. 337).

Clearly there is a need to reconsider the phyletic relationships amongst the African cichlids, a vast task unlikely to be undertaken by a single worker. The notes and comments which comprise this paper are a contribution to that end. They do not by any means constitute a complete review of all the subtleties inherent in the question 'What value can be attached to the pharyngeal apophysis as an indicator of phyletic relationships?' But, as the first detailed and systematically wide-ranging review of apophyseal structure as a whole (and not just the articular surface as was used by Regan), I believe they do provide grounds for invalidating the original evidence on which the *Tilapia-Haplochromis* dichotomy was based (see Regan, 1920).

The structure and morphology of the apophysis

Although Regan (1920 : 34) remarks that 'The character of most importance in the classification is the *structure* of the apophysis that supports the upper pharyngials, . . .' [italics mine], his subsequent key and discussion are concerned only with part of the apophysis, its articular surface (see also Regan, 1922). Thus Regan's (1920 : 34) statements that the '. . . apophysis is formed by the parasphenoid only (*Tilapia* type)' and '. . . the apophysis is formed by the parasphenoid in the middle and the basioccipital at the sides (*Haplochromis* type)' are misleading since they do not refer to the entire structure but only to part of it. In fact, both types have the parasphenoid, the basioccipital and the prootic all contributing to the apophysis. Exceptional in this respect is the genus *Tylochromis* (formerly a member of the *Tilapia* group) where only the parasphenoid is directly involved.

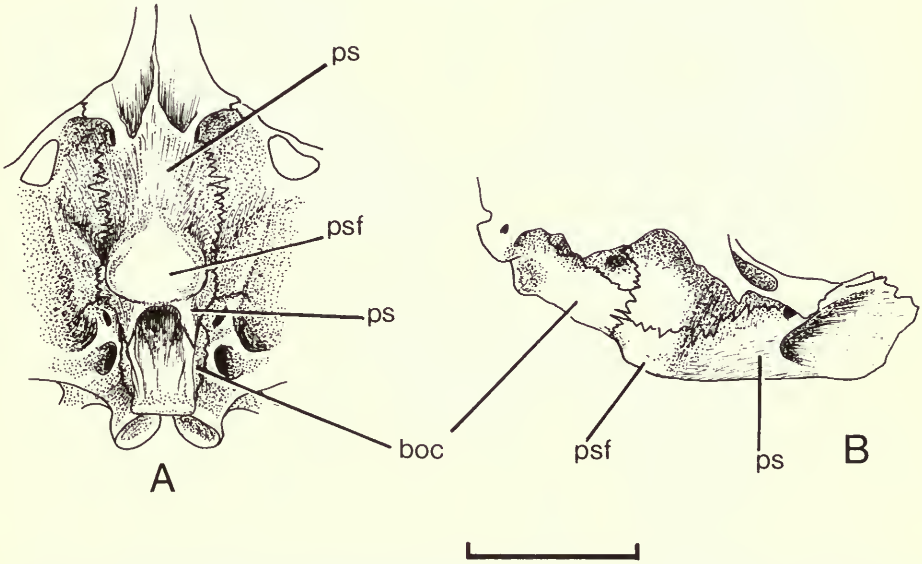

Fig. 1 *Tylochromis jentinki*. Apophysis in A: Ventral and B: Right lateral views. Scale = 5 mm.

If the interrelationships of these three bones, and their relative contributions to the body of the apophysis as well as to its articular surface, are taken into account, four apophyseal types can be recognized, viz. a *Tylochromis*, a *Tilapia*, a *Tropheus* and a *Haplochromis* type. There is possibly a fifth type, represented by *Chilochromis*, but this still requires confirmation (see p. 320).

The *Tylochromis* type is quite distinctive, but the boundaries between the *Tilapia* and *Tropheus* types on the one hand, and the *Tropheus* and *Haplochromis* types on the other, are less trenchant. However, the number of taxa showing intermediate types is relatively low and one is justified in recognizing the four modal categories, at least for descriptive purposes.

The *Tylochromis* type (Fig. 1)

When viewed laterally the apophysis appears as a slight ventral projection, its articular surface aligned in parallel with the ventral face of the basioccipital. The entire projecting part is formed by a localized hypertrophy of the parasphenoid. Although the articular surface is supported dorsally by the ventral margin of the prootic of each side, that bone does not, strictly speaking, contribute to the body of the apophysis.

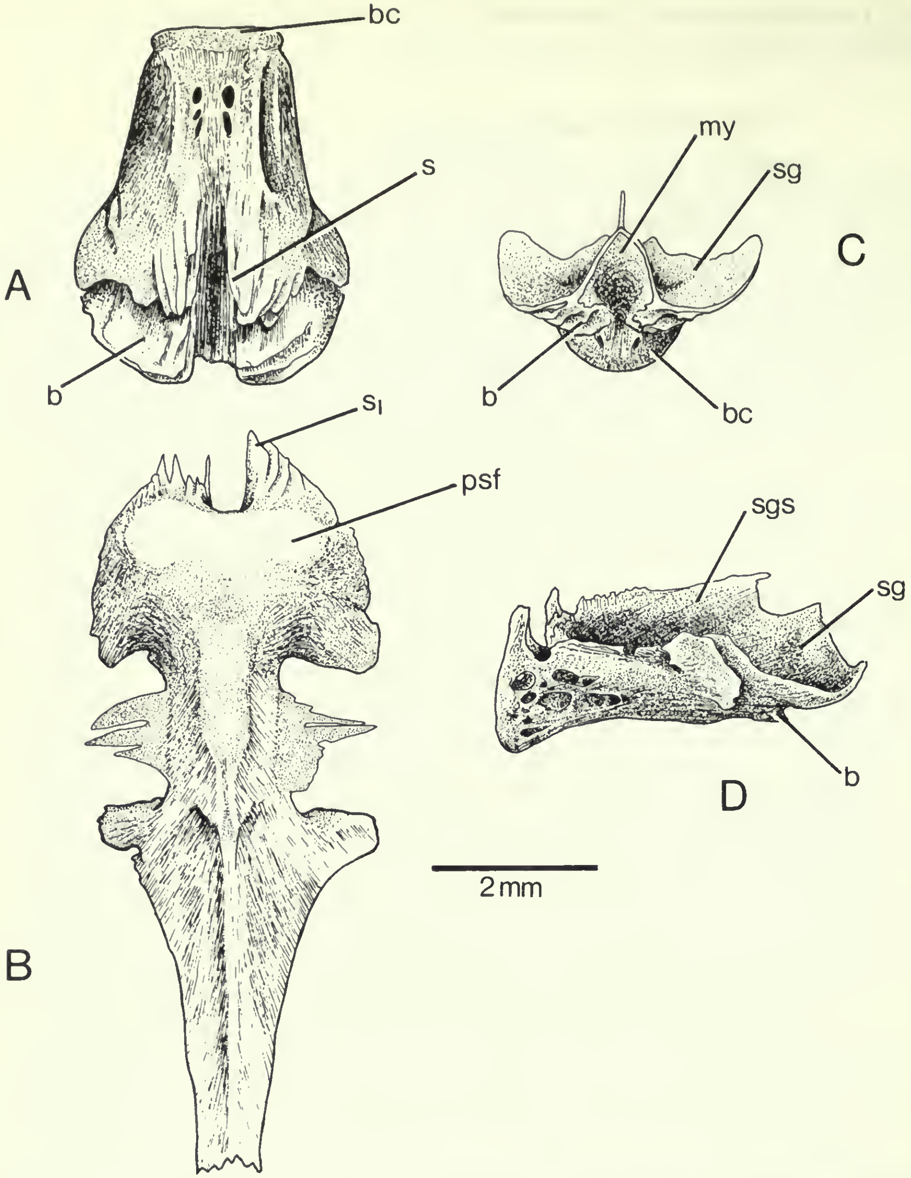

Fig. 2 *Tilapia* type apophysis (*Sarotherodon mossambicus*) disarticulated to show shape and interrelationships of the bones. A. Basioccipital, ventral view. B. Parasphenoid (posterior part), in ventral view. C. Basioccipital, anterior view. D. Basioccipital in right lateral view.

The basioccipital also plays no part in the formation of the apophyseal body, but it does act as a posteriorly placed buttress to the articular surface; the parasphenoid and basioccipital meet in a strongly developed, interdigitating suture immediately behind the apophysis (see Fig. 1B).

The articular surface (Fig. 1A) is flat and expansive, triangular or subovate in outline, and not clearly divided into left and right facets (except in the specimen of *T. microdon* examined where there is a low median ridge partly dividing the surface).

This compound description is based on the apophysis as seen in specimens of *Tylochromis jentinki* (the type species), *T. polylepis*, *T. microdon* and *T. banguelensis*.

Structurally, the *Tylochromis* apophyseal type is the simplest encountered among the African Cichlidae. It would seem to represent an early stage in the evolution of an upper pharyngeal apophysis from the presumed ancestral one in which the upper pharyngeal bones merely abutted against the parasphenoid.

Identical apophyseal structure and virtually identical apophyseal morphology are found in the genera *Etroplus* (India and Sri Lanka) and *Paretroplus* (Malagasy). A structurally very similar apophysis is also found in at least some members of the Labridae (e.g. *Coris*), although in these fishes its gross morphology is quite unlike that in the cichlids.

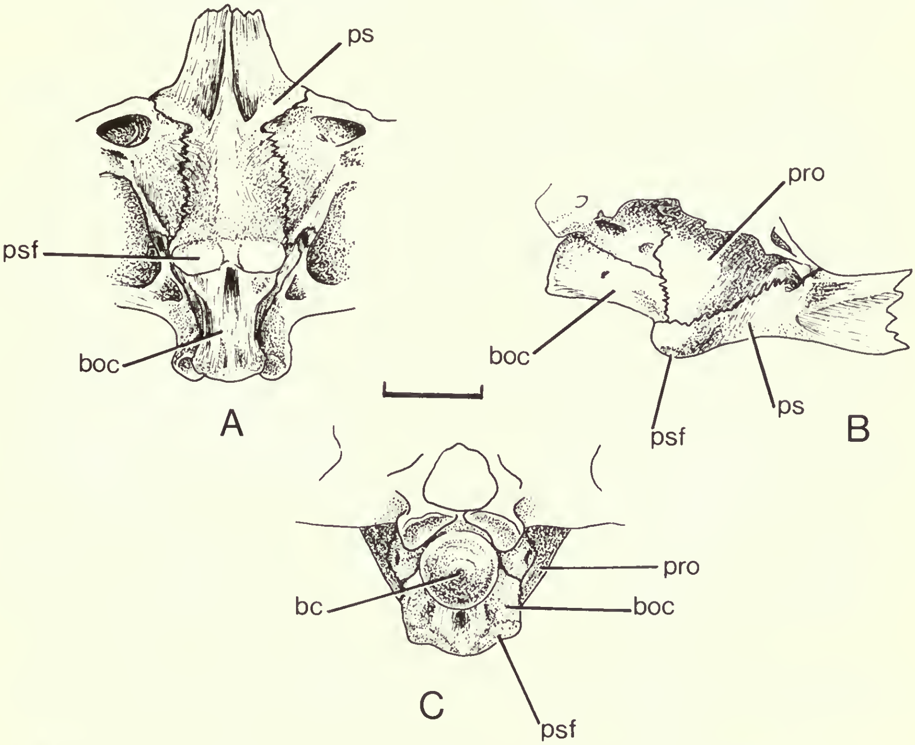

Fig. 3 *Sarotherodon shiranus*. Apophysis in A: Ventral view. B. Right lateral view. C. Posterior view. Scale = 5 mm.

The *Tilapia* type (Figs 2 & 3)

This apophyseal type differs from *Tylochromis* mainly in having a definite prootic contribution to its lateral walls (which are, indeed, formed mainly from that bone) and in having the basioccipital extending further forward so that it contributes to the body of the apophysis as well as to the support of its articular surface. The latter is, however, still formed entirely from a thickened area of the parasphenoid which caps the ventral margins of the prootic and basioccipital contribution to the side walls; the anterior wall is formed from the parasphenoid alone. No part of the prootic or of the basioccipital extends ventrally to the level of the articular surface laterally or posteriorly.

In all but *Sarotherodon niloticus* of the ten *Tilapia* and *Sarotherodon* species examined, the basioccipital forms approximately the posterior third of the lateral apophyseal wall; in *S. niloticus* it contributes somewhat less than a third, but it still forms the posterior wall and does partly overlie the posterior part of the articular surface.

Since the basioccipital overlies the parasphenoid there is some appositional contact between the bones; their principal area of contact is, however, through a deep, vertically aligned suture

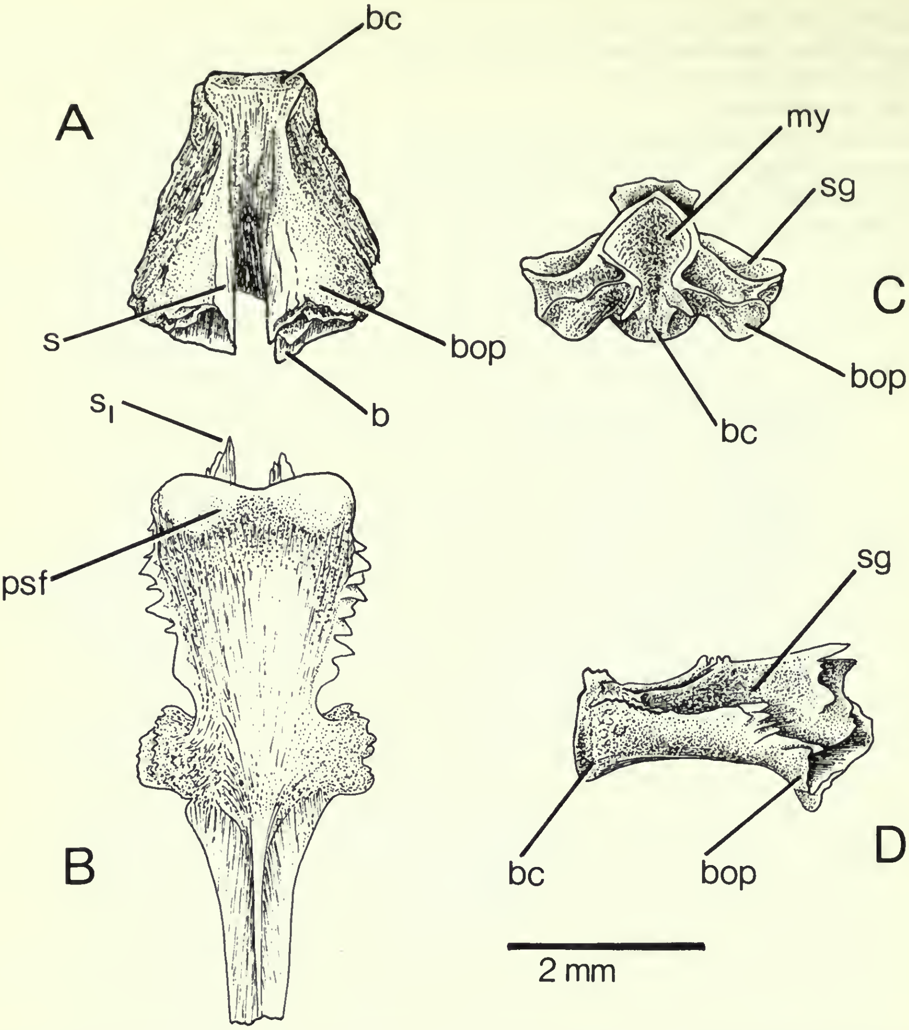

Fig. 4 *Tropheus* type apophysis (*Tropheus moorii*) disarticulated to show shape and interrelationships of the bones. A. Basioccipital, ventral view. B. Parasphenoid (posterior part) in ventral view. C. Basioccipital, anterior view, inclined slightly upwards. D. Basioccipital, right lateral view.

situated immediately behind the body of the apophysis (Fig. 2, s and s_1). That part of the basioccipital overlying the parasphenoid (the anterior portion of the saccular groove of each side) is not noticeably produced into a pair of ventrally directed processes (cf. the *Tropheus* and *Haplochromis* types).

The articular surface on the parasphenoid is distinctly subdivided by a low medial ridge into two, near-circular facets.

This compound description of the *Tilapia* type apophysis is based on the structure as seen in *Tilapia zillii*, *T. guineensis*, *T. sparrmanii* (the type species), *Sarotherodon mossambicus*, *S. esculentus*, *S. variabilis*, *S. niloticus*, *S. shiranus*, *S. squamipinnis* and *S. tanganicae*.

The *Tropheus* type (Figs 4 & 8)

In general, the body of the typical *Tropheus* type apophysis is more inflated than that of the *Tilapia* type. The articular surface, like that in the *Tilapia* type, is formed entirely, or almost entirely, from the parasphenoid.

The body of the apophysis differs from that in the *Tilapia* type in having a greater basioccipital contribution to its side wall (often as much as half), in having a greater area of the articular surface (parasphenoid) overlain by the basioccipital, and by having the ventral margins of the basioccipital contribution to the apophysis almost, or actually reaching the level of the articular surface on the parasphenoid (which is relatively thinner than in the *Tilapia* type). Occasionally the prootic may reach that level as well.

No specimen I have examined has the ventral tip of the prootic wall incorporated into the articular surface, but posteriorly the ventral margins of the anterior basioccipital processes are often somewhat inflated and appear to form part of that surface (albeit a small and narrow part). Presumably it was this latter feature that led Trewavas to consider that *Tropheus moorii* had a *Haplochromis* type of apophysis (Trewavas *in litt.*, quoted by Burchard & Wickler, 1965; also see p. 308).

It is difficult to determine whether these small inflated areas of the basioccipital are functionally part of the articular surface. In many cases, however, the tip of the basioccipital is so orientated that it could not subserve that function. In others, dissections have shown that the upper pharyngeal bones cannot be moved far enough posteriorly or posterolaterally to contact the facet-like surface. Certainly the situation differs from that in a *Haplochromis* type apophysis where the basioccipital facets provide a significant (or even major) part of the articular surface. For the *Tropheus* type all that can be said with certainty is that the parasphenoid provides the major articulatory surface, and that the principal function of the basioccipital is to provide a foundation and a buttress for the expanded articular part of the parasphenoid.

As in the *Tilapia* type of apophysis, the basioccipital portion of the apophysis is derived from the anterior part of the floor to the saccular grooves (Fig. 4). In the *Tropheus* type this area is noticeably thickened, is spongy and is produced ventrally on each side to form a pair of slender projections (Fig. 4D). Contact between the basioccipital and parasphenoid is effected through the apposition of these processes with the upper side of the expanded articular surface of the parasphenoid, and through a vertical suture on either side of the myodomal groove. This sutural contact begins immediately above the articular surface (i.e. within the myodome) and extends for a short distance behind it. The area of appositional contact between the bones is quite extensive, covering about one half of the articular region anteroposteriorly, and about one third of its width on either side. The middle third is not overlain by the basioccipital, and forms the floor of the myodome posteriorly.

The articular surface of the parasphenoid is formed from relatively thick bone and generally has two subcircular or elliptical facets separated medially by either an elevated or a depressed area of variable width.

This description is based mainly on the apophyseal structure in *Tropheus moorii*, but is representative of many other species.

The *Haplochromis* type (Figs 5 & 17)

As compared with the other types, the *Haplochromis* apophysis represents the ultimate stage in basioccipital involvement, both in the articular surface and in the body of the apophysis itself.

This structural involvement stems mainly from the increased development of the paired processes (Fig. 5D) on the anteroventral region of the basioccipital. The contribution of the basioccipital to the lateral walls of the apophysis differs little in the two types; it is usually somewhat greater in the *Haplochromis* type.

The principal difference between the *Tropheus* and *Haplochromis* apophyseal types is the nature of the articular surface. Whereas in the *Tropheus* type the expanded articular area of the parasphenoid completely or almost completely underlies the anterior end of the basioccipital, in a *Haplochromis* type most of the ventral face of the basioccipital process on each side is exposed. The bone thus becomes a major contributor to the articular surface, the parasphenoid contribution being restricted to the anterior and, generally, the posteromedial parts. The ventral face of each basioccipital process is, relatively speaking, so enlarged that the parasphenoid surface is still overlain by a substantial area of basioccipital and thus there is a considerable area of appositional contact between the two bones, an area larger, indeed, than that in the *Tropheus* type. Sutural

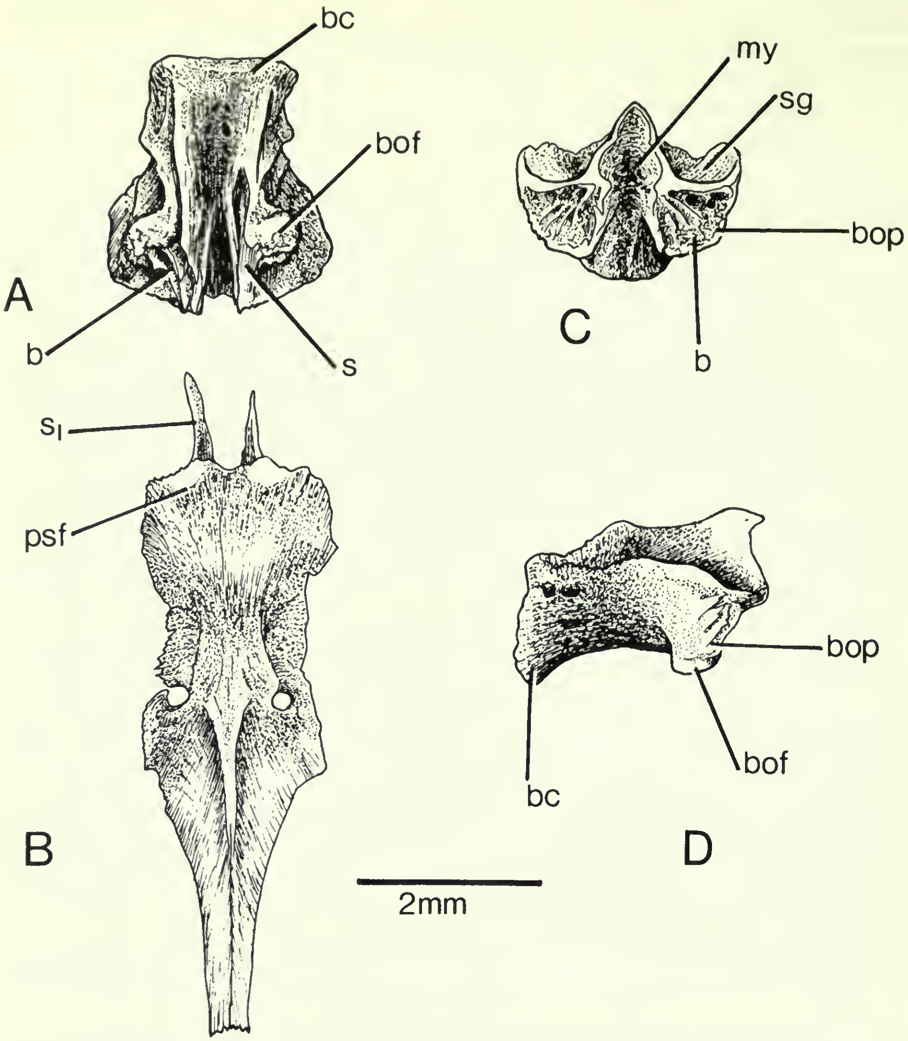

Fig. 5 *Haplochromis* type apophysis (*Haplochromis xenognathus*). A. Basioccipital, ventral view. B. Parasphenoid (posterior part) in ventral view. C. Basioccipital, anterior view, inclined slightly upwards. D. Basioccipital, in right lateral view.

contact between these bones, as in *Tropheus*, occurs below and posterior to the articular surface; it is relatively more extensive in many of the *Haplochromis* types I have examined.

Because the basioccipital invades the articular surface, the posterolateral margins of the parasphenoid are indented to accommodate the basioccipital facets. Posteromedially, the parasphenoid may extend between the facets, but when these are large and expanded medially the parasphenoid is excluded. A laterally indented parasphenoid articular surface is characteristic of a *Haplochromis* type apophysis, and is not seen in those *Tropheus* type apophyses where a part of the basioccipital extends to the level of the articular surface as a pseudofacet.

There is considerable variation in the shape of the articular area as a whole, and also in the shape of its constituent facets. The entire apophyseal structure varies in shape from the inflated, near hemispherical, to the well-circumscribed truncated-conical.

This description is based on several *Haplochromis* species (including the type *H. obliquidens*) representing many different trophic specializations (see Greenwood, 1974).

Discussion

Except for the *Tylochromis* type, all categories of apophyseal form and structure show slight departures from the modal conditions described above. The deviant forms will be discussed below when considering the distribution of apophyseal types amongst the cichlid genera of Africa.

Looked at from a developmental point of view, the four apophyseal types seem to form a continuous series, with the *Tylochromis* type as the basic one (see p. 299) and the *Haplochromis* type as the most derived form. The principal change involved in this transition series is an increased involvement of the basioccipital, both in the body of the apophysis and in its articular surface. However, I can find no characters which might argue against the possibility of the *Tropheus* type representing a 'regressional' trend from the *Haplochromis* condition rather than a 'progressive' one from the *Tilapia* type.

The value of the apophysis as an indicator of phyletic relationships will be discussed later (p. 321).

A review of apophyseal structure in the African cichlid genera

Regan's opinion (1920 : 34) that the structure of the apophysis is the 'character of most importance in classification' referred to its value in providing a 'natural arrangement' of the genera which he defined mainly on the basis of oral and pharyngeal dentition (see Regan, 1920, 1921& 1922).

The recognition of four rather than two apophyseal types necessitates a review of the apophysis in all cichlid genera as a first step towards re-evaluating its significance in cichlid phylogeny. The review which follows must be considered a preliminary one since skeletal material was not available for all species of every genus (especially those Lake Malawi species referred to the genus *Haplochromis*), nor for some of the fluviatile and crater-lake species of West Africa. The preliminary nature of this analysis was also enforced by the fact that it was rarely possible to examine more than one or two specimens of a species, and then only over a limited size range. Ontogenetic studies could well provide valuable information on the problem of the *Tropheus* apophysis and its relationship to the *Haplochromis* type (see p. 322).

Wherever possible I have examined a specimen of the generic type species; such specimens are indicated thus †. Also, wherever possible, I have utilized or at least examined the skeletal preparations used by Regan (1920, 1921 & 1922). Many of these are now in a poor state of preservation; where this is so, I have used newly prepared material instead.

Where, on the basis of its apophyseal structure, a species is now considered to belong to a group other than that in which it was placed by Regan, it is noted thus *.

The neurocranial length (NcL), measured directly from the tip of the vomer to the posterior margin of the basioccipital, is given for all skulls examined.

A list of the material studied, quoting museum register numbers, or other cataloguing notations, is available in the Fish Section and the General Library of the British Museum (Nat. Hist.).

Since Regan's paper (1920) on the Tanganyika genera was published, Poll (1946 & 1956) has carried out two major revisions of the fishes from that lake. As a result several of Regan's genera have been sunk in synonymy, others subdivided and new genera erected. Because Poll does not take apophyseal characters into account, and because I am reviewing Regan's grouping of the taxa on these characters, I shall use Regan's nomenclature and classification, noting where relevant the subsequent taxonomic history of the taxon; where possible, however, Poll's new genera are described. For the same reasons I shall not use the revised taxonomy introduced for some species by Liem & Stewart (1976). This action must not be taken to infer my rejection of these workers' results nor as an implied criticism of them. A critical commentary on generic limits is beyond the scope of this paper.

For Lake Malawi I have used the classification and nomenclature proposed by Trewavas (1935). Trewavas followed Regan's (1921) grouping save for a few species which she transferred from the *Tilapia* to the *Haplochromis* group, and two genera (*Otopharynx* and *Cyrtocara*) which she synonymized with *Haplochromis*.

With a few exceptions, such as *Hemichromis*, *Pelmatochromis* (*sensu* Regan, 1922), *Chilotilapia* and *Tylochromis*, the entirely or predominantly fluviatile genera are not covered in this review.

Lake Tanganyika

TYLOCHROMIS type (p. 299)

Tylochromis polylepis (Blgr.); NcL: 31 mm.
The apophysis does not depart in any significant way from that of the other *Tylochromis* species examined.

TILAPIA type (p. 301)

1 † *Sarotherodon tanganicae* (Günther); NcL: 34 mm.
This, the type species of Regan's (1920) genus *Neotilapia*, was placed in *Tilapia* by Poll (1956), but should now be included in the genus *Sarotherodon* as defined by Trewavas (1973a). Its apophysis is of a typical *Tilapia* type.

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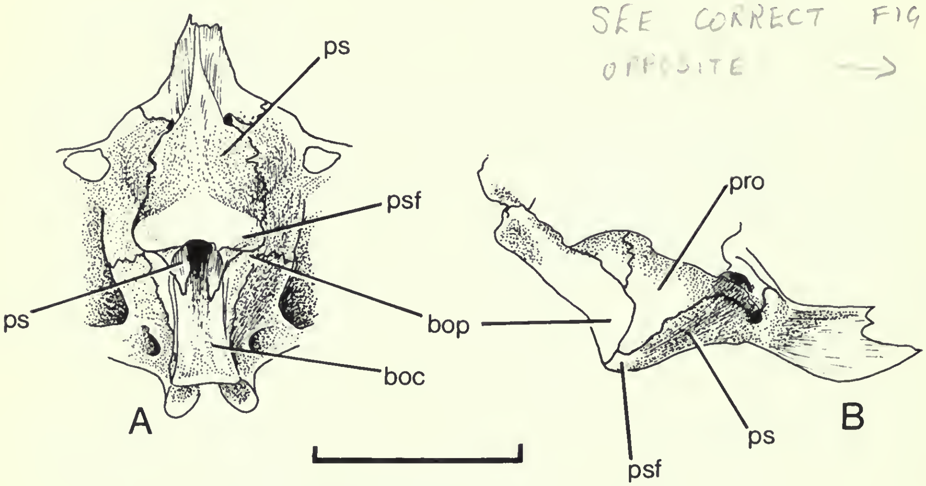

Fig. 6 *Boulengerochromis microlepis*. Apophysis in A: Ventral and B: Right lateral view. Scale = 5 mm.

2 † *Boulengerochromis microlepis* (Blgr.); NcL: 37 mm; Fig. 6.
The apophysis differs from the modal *Tilapia* type (p. 301) only in having a slightly thinner articular area of the parasphenoid; neither the prootic nor the basioccipital reaches the level of the articular surface, and both bones are capped by the parasphenoid in a typical *Tilapia* fashion.

3 † *Cyphotilapia frontosus* (Blgr.); NcL: 42 mm.
The apophysis is virtually identical with that in *Boulengerochromis microlepis*.

4 *Simochromis dardennii* (Blgr.); NcL: 40 and 48 mm; Fig. 7A & B.
The apophysis is very similar to that in *Boulengerochromis* and *Cyphotilapia*, although the basioccipital forms rather more of the lateral walls in the former species.

The other species of *Simochromis* examined have an apophyseal structure and form approaching the modal *Tropheus* type (see p. 310).

5 † *Petrochromis polyodon* Blgr.; NcL: 23 and 33 mm.
In this species the apophysis could be classified either as a modified *Tilapia* or as a modified *Tropheus* type. The parasphenoid articular surface is relatively thinner than in the *Tilapia* type, the basioccipital contributes almost half of each lateral wall, and there are a pair of ventrally directed prominences on the anterior part of the basioccipital (see *Tropheus* type, p. 302). However, unlike the typical *Tropheus* condition, the basioccipital and prootic are capped ventrally by the parasphenoid in the characteristic *Tilapia* fashion, and do not reach the level of the articular surface.

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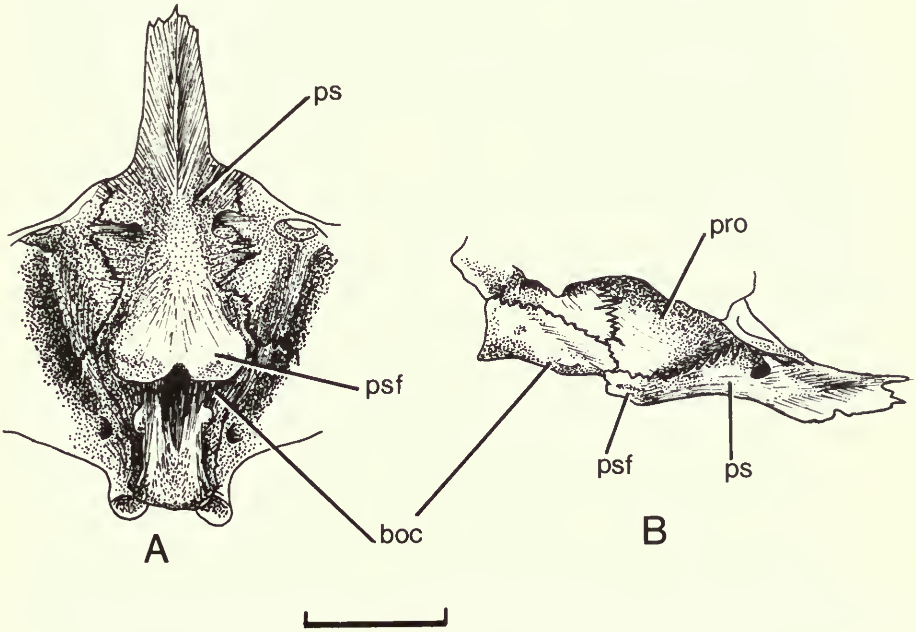
Due to a printing error the drawing for figure 13 was also reproduced as figure 6 on page 306; the correct figure 6 is printed below. The caption for the figure on page 306 is correct.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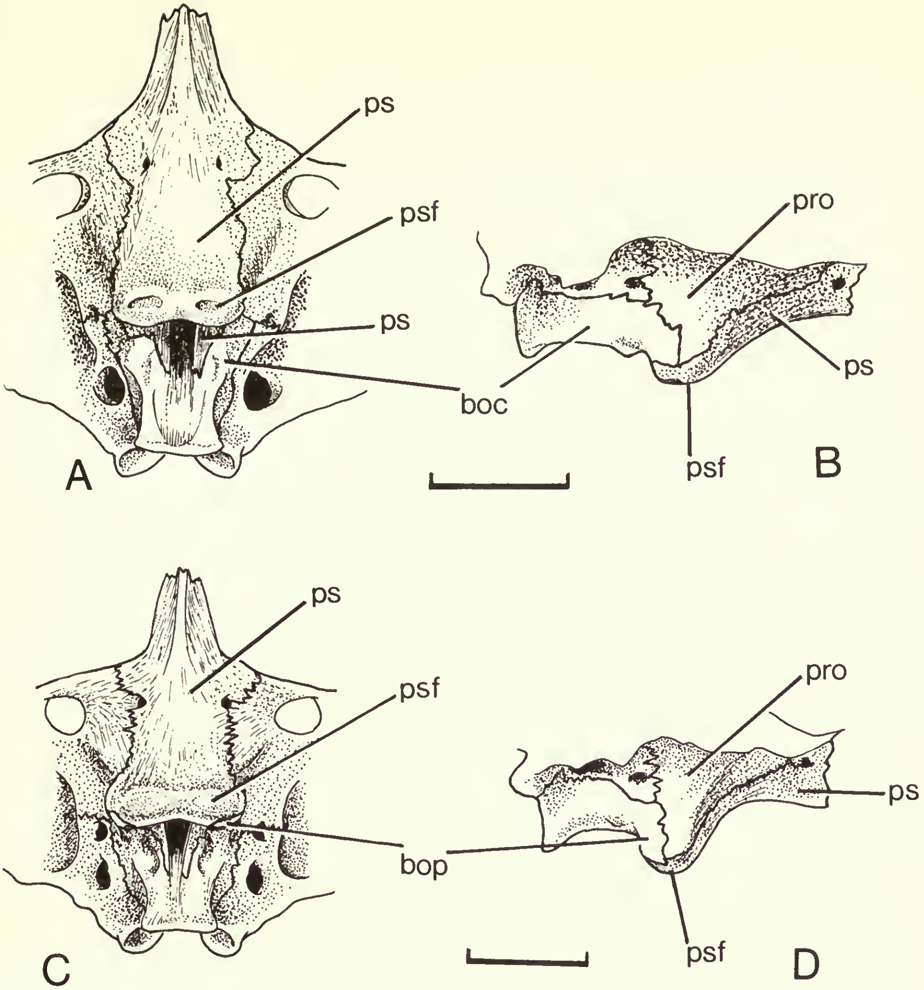

Fig. 7 A and B. *Simochromis dardennii*, apophysis in ventral and right lateral views respectively. C and D. *Simochromis diagramma*, apophysis in ventral and right lateral views respectively. Scale = 5 mm.

TROPHEUS type (p. 302)

Except for those taxa indicated by an asterisk, all the species now placed in this category were previously included by Regan (1920) in his *Tilapia* group. Asterisked species were formerly in the *Haplochromis* group. No annotation after a species indicates that it has a typical *Tropheus* type apophysis (see p. 302).

1 † *Asprotilapia leptura* Blgr.; NcL: 17 mm.
The entire apophysis is greatly inflated, but retains a typical *Tropheus* structure.

2 *† *Aulanocranus dewindti* (Blgr.); NcL: 21 mm.
Apophysis typical structurally, but inflated.

3 † *Cardiopharynx schoutedeni* Poll; NcL: 27 mm.

4 † *Cunningtonia longiventralis* Blgr.; NcL: 23 mm.

5 *a*† *Cyathopharynx grandoculis* (Blgr.); NcL: 21 mm.
The basioccipital and the prootic extend ventrally to the level of the parasphenoidal articular surface, but do not contribute to it.

b Cyathopharynx furcifer (Blgr.); NcL: 29 mm.
The prootic and basioccipital do not quite reach the level of the articular surface, but are not capped by the parasphenoid as in a typical *Tilapia* apophysis (see p. 301).

Poll (1946) synonymized these two species; *C. grandoculis*, the type of the genus, is the junior synonym.

6 *† *Ectodus descampsii* Blgr.; NcL: 20 mm.
The basioccipital extends ventrally to the level of the parasphenoidal articular surface, but does not contribute to it.

7 *† *Enantiopus melanogenys* Blgr.; NcL: 22 mm.
Although placed by Regan (1920) in the *Haplochromis* group, the apophysis is of a modal *Tropheus* type. The specimen examined by Regan is poorly prepared and preserved, but nevertheless its *Tropheus*-like apophyseal features are still apparent; a newly prepared specimen confirms this.

Poll (1956) synonymized *Enantiopus* with *Xenotilapia*, which genus has a *Haplochromis* type of apophysis. The other *Enantiopus* species I have examined (*E. boulengeri* (Poll)) does have a *Haplochromis* type of apophysis (see p. 313, under *Xenotilapia*); see also *Stappersia singularis*, page 312, a species now considered to be a junior synonym of *E. ochrogenys* (Poll, 1956).

8 *a*† *Limnochromis auritus* (Blgr.); NcL: 19 mm.
b L. leptosoma (Blgr.); NcL: 17 mm.
c L. otostigma Regan; NcL: 16 mm.
Poll & Thys van den Audenaerde (1974) erected the genus *Triglachromis* for this species.
d L. pfefferi (Blgr.); NcL: 20 mm.
Poll (1974) placed this species in the genus *Haplochromis* but made no reference to the nature of its pharyngeal apophysis.

9 † *Limnotilapia dardennii* (Blgr.); NcL: 33 mm.

10 *a*† *Ophthalmotilapia boops* (Blgr.), From a dissection; specimen: 77 mm SL.
b O. ventralis (Blgr.); NcL: 17 mm.
The apophysis is identical in both species. Poll (1956) erected the genus *Ophthalmochromis* for *Ophthalmotilapia ventralis*.

11 † *Perissodus microlepis* Blgr.; NcL: 20 mm.
See Liem & Stewart (1976).

12 † *Tropheus moorii* Blgr.; NcL: 18, *c*. 21 and 22 mm. Figs 4 & 8.
In two of the three specimens examined, the basioccipital reaches the level of the parasphenoid articular surface on one side but does not contribute to it. It was probably these specimens that led Trewavas to write '. . . the structure of the pharyngeal apophysis in *Tropheus* was one of Regan's mistakes; it is of the *Haplochromis*-type . . .' (quoted *in litt.* by Burchard & Wickler, 1965). In my opinion, however, the entire structure of the apophysis in this specimen is not of the *Haplochromis* type, and the basioccipital tip does not form an articular facet as it would (and bilaterally too) in a true *Haplochromis* apophysis.

The third specimen does not have its basioccipital process extending so far ventrally and its articular surface could not be mistaken for that of a *Haplochromis* type.

13 *† *Xenochromis hecqui* Blgr.; NcL: 50 mm.
Liem and Stewart (1976) have synonymized this genus with *Perissodus*.

The following species have an apophyseal structure that departs from the modal *Tropheus* type but which could be considered a modification of it.

1 *† *Haplotaxodon microlepis* Blgr.; NcL: 37 mm.
Regan (1920) was probably misled into placing this genus in his *Haplochromis* group because of the expanded ventral tips to the basioccipital processes. These lie posterolaterally to the parasphenoid articular surface and not within an embayment of the parasphenoid (as do the basioccipital facets in the *Haplochromis* apophyseal type; see p. 304). Furthermore, what appears to be a facet formed on each expanded basioccipital tip actually slopes steeply away from the

parasphenoid articular surface, does not therefore contribute to it, and is not contacted by the upper pharyngeal bone of its side (at least in dried skeletons and preserved whole specimens).

The apophysis in *Bathybates ferox* (here treated as being of the *Haplochromis* type, see p. 310) resembles that in *Haplotaxodon*. But, the extent to which the basioccipital contributes to the lateral and posterolateral walls of the apophysis in *Haplotaxodon* is greater than in *Bathybates*. In this respect it approaches the *Haplochromis* condition more closely than it does *Tropheus* one.

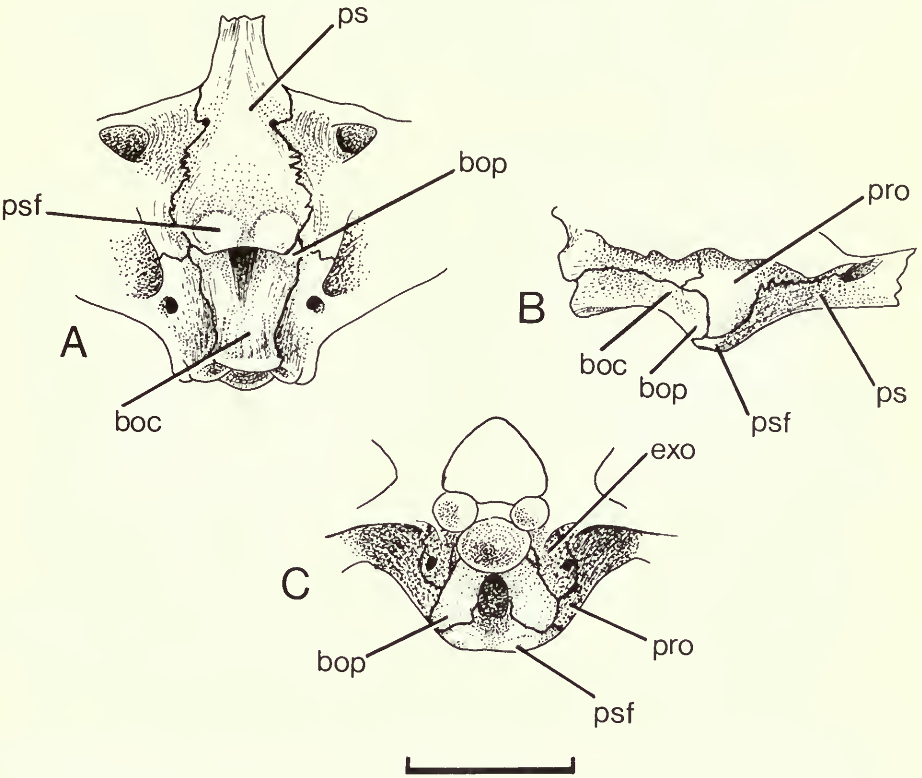

Fig. 8 *Tropheus moorii*. Apophysis in A: Ventral, B: Right lateral and C: Posterior views. Scale = 5 mm.

2 *† *Hemibates stenosoma* (Blgr.); NcL: 36 mm. Fig. 9.
In this species there is, on each side, a small circular and clearly circumscribed facet developed on the posterolateral part of the basioccipital contribution to the apophyseal wall. The facet abuts on the posterolateral margin of the parasphenoid, which is not, however, indented to receive it (as it would in a typical *Haplochromis* apophysis); its surface is inclined slightly upwards and away from the plane of the parasphenoidal articular surface.

From a dry skull one certainly gets the impression that the upper pharyngeal bones could slide across these basioccipital 'facets'. Their angle and direction might then serve to accentuate any anteroposterior rocking action imparted to the bones as they are moved across the apophysis. However, a dissection reveals that the pharyngeal bones cannot be retracted sufficiently far posteriorly for the 'facet' to serve as such, and also that the paired dorsal aorta of each side actually runs across it. No muscles or ligaments are attached to the 'facet', and so its origin and function remain unknown.

Apophyseal morphology and structure in *Hemibates* are some of the most unusual so far encountered amongst the Lake Tanganyika Cichlidae. I have included *Hemibates* in the modified

Tropheus category only because its basic apophyseal structure, in particular the relationship of the parasphenoid and basioccipital, is nearer that of the modal *Tropheus* type than of the modal *Haplochromis* condition. (See also *Haplochromis euchilus*, p. 316.)

3 *† *Plecodus paradoxus* Blgr.; NcL: 19 and 38 mm.
The apophysis is very like that of *Haplotaxodon*; in the smaller specimen examined, however, there is no facet-like surface developed on the basioccipital. Again, dissections show that the upper pharyngeal bones articulate only with the parasphenoid.

Liem & Stewart (1976) place *Plecodus* in synonymy with *Perissodus*.

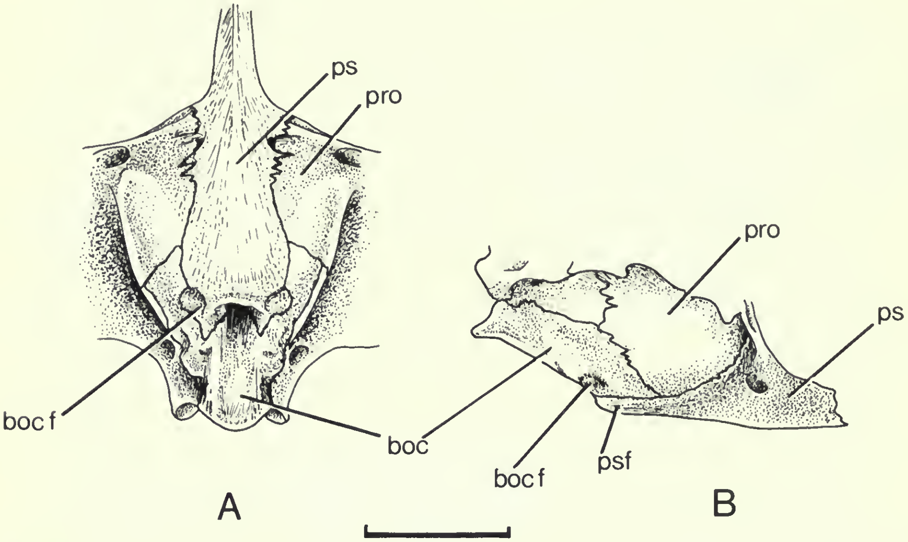

Fig. 9 *Hemibates stenosoma*. Apophysis in A: Ventral and B: Right lateral views. Scale =5 mm.

4 † *Lobochilotes labiatus* Blgr.; NcL: 21, 32, 57 mm. Fig. 10.
The basioccipital contribution to the apophysis is very like that in *Simochromis diagramma* (see below); the relative size of the facet-like surfaces differs in the three specimens examined, but is always small.

5 *a* † *Simochromis diagramma* Günth.; NcL: 22 and 30 mm; Fig. 7C & D.
As in several other species with a *Tropheus* type apophysis, the basioccipital in *S. diagramma* reaches the level of the parasphenoidal articular surface posterolaterally. *Simochromis diagramma* differs, however, in having the ventral tip of each basioccipital process somewhat more expanded and thus facet-like. The position and size of each 'facet' suggests that, unlike the other *Tropheus* type species, the facets in *S. diagramma* may form part of the articular surface. In this sense the apophysis is *Haplochromis*-like, but its overall structure is more like that of the modal *Tropheus* type.

b S. babaulti Pellegrin; NcL: 15 mm.
The apophysis is nearer the *Tropheus* type than is that of the *S. diagramma* specimens examined; the basioccipital 'facet' is developed unilaterally, and is smaller than in *S. diagramma.*

The entire apophysis in both *S. diagramma* and *S. babaulti* is more inflated than it is in *S. dardennii* (here considered to be of the *Tilapia* type).

HAPLOCHROMIS type (p. 303)

1 *a* † *Bathybates ferox* Blgr.; NcL: 26 and 80 mm; Fig. 11.
In many respects the apophysis of the smaller of the two specimens could be classified in the *Tropheus* group. The basioccipital, which forms about half the lateral wall of the apophysis,

extends ventrally to the level of the parasphenoidal articular surface and lies adjacent to the entire lateral aspect of that surface (which is not indented to receive the basioccipital). That part of the basioccipital adjacent to the parasphenoid is somewhat inflated, and its ventral surface is flattened to form a facet-like region which continues the surface of the parasphenoid articular area posterolaterally. Unlike the typical *Haplochromis* condition, these facet-like areas of the basioccipital are not sharply demarcated from the overlying body of the bone. It is the seemingly continuous articular surface between the parasphenoid medially and the basioccipital laterally that most clearly distinguishes the apophyseal surface in a small *B. ferox* skull from that in a larger (38 mm NcL) skull of *Plecodus paradoxus* (here treated as a modified *Tropheus* type; see p. 310). In other words, the basioccipital in *P. paradoxus* does not contribute to the articular surface, whereas in *B. ferox* it does appear to do so.

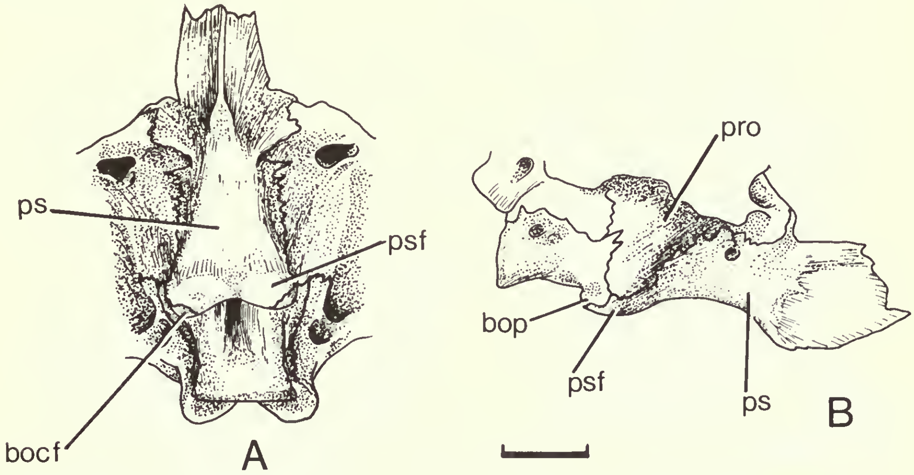

Fig. 10 *Lobochilotes labiatus*. Apophysis in A: Ventral and B: Right lateral views. Scale = 5 mm.

The apophysis in the smaller specimen of *B. ferox*, when compared with that from a larger fish, provides a good example of the rather blurred demarcation between the *Haplochromis* and *Tropheus* apophyseal types. In the larger skull (80 mm NcL) the apophysis is almost typically *Haplochromis*-like, with large and clearly demarcated basioccipital facets formed from the ventral face of each process. The parasphenoid, however, is not indented to receive the facets as is usual in an apophysis of the *Haplochromis* type.

b B. minor Blgr.; NcL: 40 mm. Fig. 12.

The basioccipital facets are much more clearly differentiated in this species, are larger, and make the apophysis a typical *Haplochromis* one.

2 † *Callochromis macrops* (Blgr.); NcL: 26 mm.

The basioccipital facets are smaller than is usual in most apophyses of the *Haplochromis* type, but otherwise the apophysis is typical for that group.

3 † *Eretmodus cyanostictus* Blgr.; NcL: 15 mm.

A typical *Haplochromis* apophysis in which the basioccipital facets are large and contribute to slightly more than half the area of the articular surface.

4 † *Grammatotria lemairii* Blgr.; NcL: 44 mm.

A typical *Haplochromis* apophysis, but one with elongate and narrow basioccipital facets (cf. *Stappersia singularis* and *Xenotilapia* spp.).

5 *Haplochromis burtoni* (Günth.); NcL: 14 mm.

6 *Haplochromis horii* (Günth.); NcL: 28 mm.

7 † *Julidochromis ornatus* Blgr.; NcL: 14 mm.
Structurally the apophysis is of the *Haplochromis* type and has large basioccipital facets, but the entire body is flatter and broader than is usual in that group.

8 *a* † *Lamprologus congolensis* Schilthuis; NcL: 14 mm.
The posterior part of the apophysis is typically *Haplochromis*-like, but the prootic section is greatly inflated. The basioccipital facets are large and clearly demarcated.

b L. lemairii Blgr.; NcL: 37 mm.
A typical *Haplochromis* apophysis.

9 † *Leptochromis calliurus* (Blgr.); NcL: 20 mm.
The apophysis is squat and broad, but otherwise is typical.

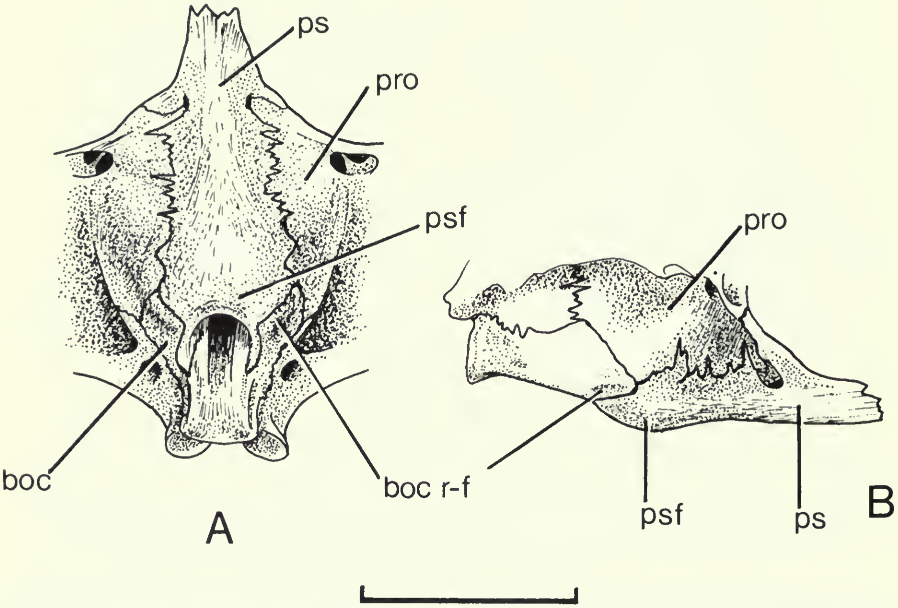

Fig. 11 *Bathybates ferox*. Apophysis in a skull 26 mm long. A: Ventral and B: Right lateral views. Scale = 5 mm.

10 † *Parectodus lestradei* Poll; NcL: 18 mm.
The basioccipital facets are small and, unlike the condition in a typical *Haplochromis* apophysis, are not clearly demarcated from the overlying body of the bone. However, since the parasphenoidal part of the articular surface is indented to receive the basioccipital facets, and because the anteroventral part of the basioccipital is clearly produced into a pair of ventrally directed processes (whose distal surfaces form the facets) the apophysis must be considered structurally of the *Haplochromis* and not of the *Tropheus* type. The presence of functional basioccipital facets in the articular surface of the apophysis reinforces this conclusion.

Poll (1956) placed the genus *Parectodus* in synonymy with *Xenotilapia* (see p. 313).

11 † *Stappersia singularis* Blgr.; partial dissection of holotype, 76 mm SL.
As far as I can tell from a partial dissection, the apophysis is of a *Haplochromis* type, but has elongate and narrow basioccipital facets.

The apophysis in a similar-sized specimen of *Enantiopus ochrogenys*, the species with which *S. singularis* is now synonymized (see below), is definitely a *Haplochromis* type, with narrow and elongate basioccipital facets.

Poll (1946) synonymized *S. singularis* with *Enantiopus ochrogenys* Blgr., 1914. Later (1956), he considered *Enantiopus* to be a junior synonym of *Xenotilapia*. It will be recalled that the type species of *Enantiopus*, *E. melanogenys*, has a *Tropheus* apophysis (see p. 308) but in *Xenotilapia* it is of the *Haplochromis* type (see below).

12 † *Telmatochromis temporalis* Blgr.; NcL: 14 mm.

13 *a* † *Trematocara marginatum* Blgr.; NcL: 30 mm.
b *T. unimaculatum* Blgr.; NcL: *ca* 28 mm.

Both species have a greatly inflated apophysis; the basioccipital facets form slightly more than half the articular surface.

14 *a* † *Xenotilapia sima* Blgr.; NcL: 25 mm.

The apophysis is structurally of the *Haplochromis* type, but has long and narrow basioccipital facets.

b *X. ornatipinnis* Blgr.; NcL: 21 mm.

Apophysis as in *X. sima*.

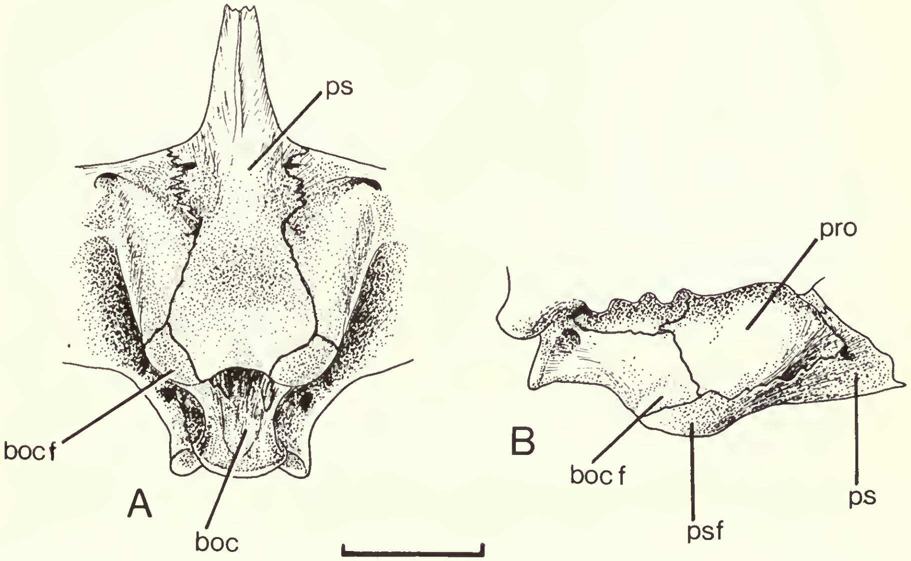

Fig. 12 *Bathybates minor*. Apophysis in a skull 40 mm long. A: Ventral and B: Right lateral views. Scale = 5 mm.

c *X. boulengeri* (Poll); NcL: 26 mm.

Apophysis as in *X. sima*. Originally this species was placed in the genus *Enantiopus*, a genus which Poll (1956) later synonymized with *Xenotilapia*. The type species of *Enantiopus* has a *Tropheus* type of apophysis (see *E. melanogenys*, p. 308).

The genus *Parectodus* (see p. 312) has also been synonymized with *Xenotilapia* (see Poll, 1956).

Lake Malawi

Trewavas (1935 : 69) considered all the endemic genera of Lake Malawi to be members of Regan's *Haplochromis* apophyseal group.

In an earlier paper, Regan (1921) had classified *Corematodus* and *Hemitilapia* in his *Tilapia* group, and described the apophysis in *Otopharynx* and *Chilotilapia* as being formed by the parasphenoid and prootic only, an apparently unique apophyseal form otherwise found only in *Chilochromis* from the Congo drainage basin (Regan, 1922; see also p. 320 below). Trewavas (1935) synonymized *Otopharynx* with *Haplochromis* (considering it to have a *Haplochromis* type apophysis) but retained *Chilotilapia* as a genus because of its characteristic jaw structure and dentition; its apophysis she identified as being of the *Haplochromis* type. Trewavas retained *Corematodus* and *Hemitilapia* as distinct genera, also on the basis of their jaw structure and dentition, and again considered the apophysis to be *Haplochromis*-like.

I have examined the apophysis in all these disputed taxa, as well as in at least one species of the other endemic genera. Regrettably it has not been possible to study skeletal preparations of all the so-called *Haplochromis* species in Lake Malawi. Those that are available will be considered below. Even from this small sample it is clear that not all conform to the modal *Haplochromis* type described on page 303, and that there is, in this respect, greater variation than amongst the *Haplochromis* of Lake Victoria.

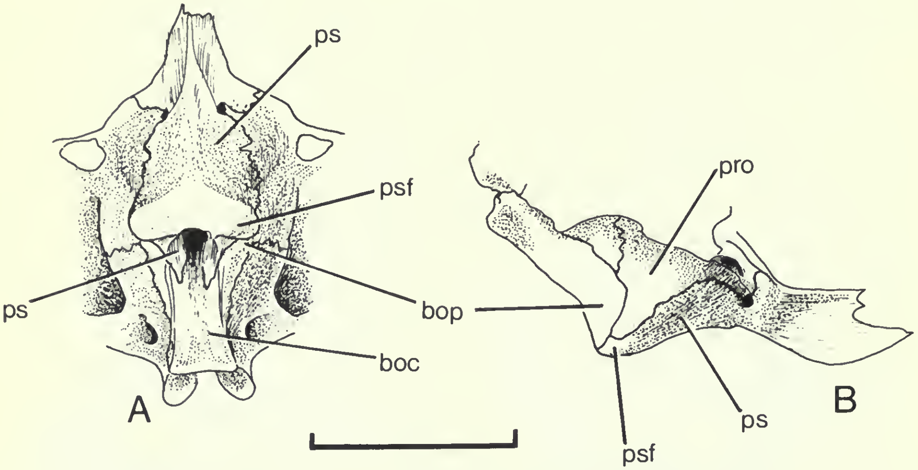

Fig. 13 *Haplochromis triaenodon*. Apophysis in A: Ventral and B: Right lateral views. Scale = 5 mm.

TILAPIA type (p. 301)

Skeletal preparations are available for only two of the five endemic *Sarotherodon* species (viz. *S. shiranus* (Blgr.) and *S. squamipinnis* (Günth.)). Both have a *Tilapia* type apophysis with, in *S. shiranus* (Fig. 3) the basioccipital contributing from a third to a quarter of the lateral wall, but in *S. squamipinnis* rather less than a quarter.

TROPHEUS type (p. 302)

The occurrence of this apophyseal type amongst Malawi cichlids has not, of course, been recorded previously (see p. 313 above).

The zoogeographical implications of its presence in Lake Malawi cannot be evaluated until more is known about the phylogenetic history of the *Tropheus* apophysis. If, as seems possible, a *Tropheus* type apophysis is merely a modification of the *Haplochromis* type, then it could have evolved several times over, and from different ancestral stocks within the *Haplochromis* lineage. In that case no great significance can be attached to the presence of a *Tropheus* apophyseal type in both Lakes Malawi and Tanganyika, but not apparently in Lake Victoria (nor from the species of Lakes Rudolf, Edward, George, Kivu and Albert; personal observations based on adequate samples only from Lake Rudolf).

The same restrictions apply to the interpretation of the similar apophyseal morphology in *Haplochromis euchilus* of Lake Malawi and *Hemibates stenosoma* of Lake Tanganyika (see below, p. 316). In this case, the condition found in *Haplochromis euchilus* is nearer the *Haplochromis* type, but the two species could be taken to represent a structural–morphological series linking the modal *Haplochromis* condition with the modal *Tropheus* one.

1 † *Cynotilapia afra* (Günth.); NcL: 15 mm (two specimens, one an alizarin preparation). The apophysis is virtually identical with that in *Tropheus moorii* of Lake Tanganyika (see p. 308).

2 *Haplochromis triaenodon* Trewavas; NcL: 27 mm. Fig. 13.
This species has a non-inflated *Tropheus* type of apophysis in which the basioccipital does not quite extend ventrally to the level of the parasphenoidal articular surface. However, it does lie lateral to the parasphenoid so that it is not capped by that bone as it would be in a typical *Tilapia* apophysis.

3 *Pseudotropheus macrophthalmus* Ahl; NcL: 18 mm (and a dissection of the apophysis in a specimen 97 mm SL; the skull is from a fish of *c.* 74 mm SL). See Fig. 14.

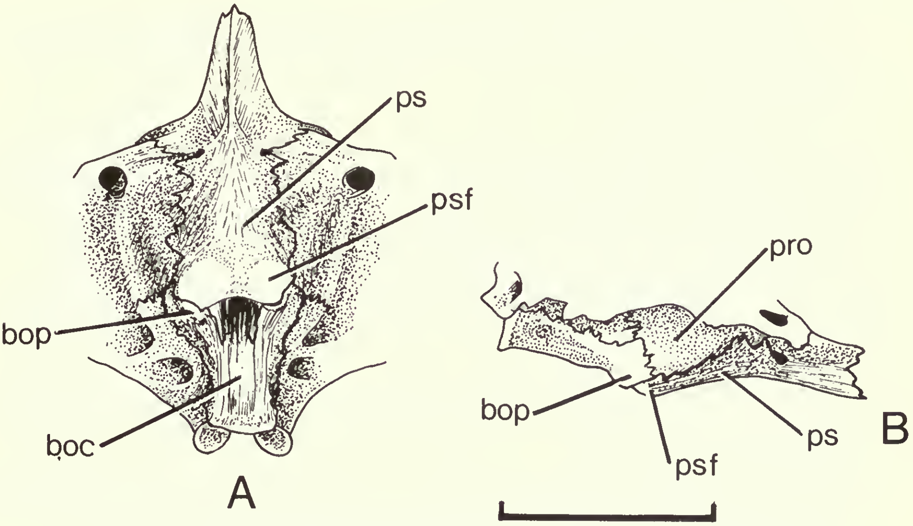

Fig. 14 *Pseudotropheus macrophthalmus*. Apophysis in A: Ventral and B: Right lateral views. Scale = 5 mm.

Both specimens have a somewhat inflated apophysis which closely approximates to that in the *Simochromis babaulti* specimens (*ex* Lake Tanganyika) described on page 310. The basioccipital reaches ventrally to the level of the parasphenoid articular surface, and in one specimen the bone shows what appears to be an ill-defined, facet-like area on one side (see Fig. 14A, right side of apophysis). However, as in *S. babaulti*, the extent to which the facet might contribute to the articular surface, and the general structure of the apophysis, are nearer the *Tropheus* than the *Haplochromis* type.

The other *Pseudotropheus* species examined will be considered below (under *Haplochromis* type).

Three other species should perhaps be reviewed at this point although in some respects their apophyses could be considered as modifications of the *Haplochromis* type.

1 *Haplochromis auromarginatus* (type species of Regan's (1921) genus *Otopharynx*).
The apophysis resembles that in the Tanganyika species *Simochromis diagramma* (see p. 310 and Fig. 7C & D). However, in *H. auromarginatus* (NcL: 42 mm) the basioccipital does not extend quite so far ventrally and the tips of its ventral processes (on either side of the parasphenoid) are more prominent than in *S. diagramma*. Despite the facet-like appearance of these basioccipital tips they clearly cannot serve as such because of their dorsal position relative to the parasphenoidal articular surface.

It is difficult to determine whether this apophyseal form should be classified as a modified *Tropheus* type or as a modified *Haplochromis* one. Taken in its entirety, and with especial regard to the position of the basioccipital 'facets' (see above), it would seem to have more affinity with the

Tropheus type. I cannot understand how Regan (1921) thought that the articular surface was formed from the prootic and parasphenoid only (see p. 313 above).

The second species included by Regan in *Otopharynx* (*O. selenurus*) has a typical *Haplochromis* type apophysis; together with *O. auromarginatus*, it was transferred to the genus *Haplochromis* by Trewavas (1935).

2 *Haplochromis chrysonotus* (Blgr.); NcL: 21 and 23 mm.
The apophysis is of the inflated *Tropheus* type with the basioccipital reaching the level of the parasphenoidal articular surface. In one specimen (23 mm NcL) the anteroventral tips of the basioccipital are slightly expanded, but neither forms a true facet and the parasphenoid is not indented to receive them.

3 *Haplochromis guentheri* Regan; NcL: 28 mm.
The apophysis is damaged in the only skeleton available. However, its general appearance suggests that the nature of the articular surface is intermediate between that of the two *H. chrysonotus* specimens described above.

HAPLOCHROMIS type (p. 303)

I have examined the apophysis in at least one specimen of all the endemic genera[1] reviewed by Trewavas (1935), except for the monotypic *Christyella* (=*Gephyrochromis*, see Trewavas, 1946) and *Aristochromis*, which are represented by holotypes only.

In general, I would agree with Trewavas' view that these taxa have a *Haplochromis* type of apophysis, although some do deviate from the modal condition.

Before discussing these deviant species, mention must be made of the *Pseudotropheus*, other than *P. macrophthalmus* (p. 315; Fig. 14) I have examined, the latter having a *Tropheus* type apophysis.

Pseudotropheus williamsi (the type species) has a *Haplochromis* type apophysis, albeit one with rather small basioccipital facets; *Pseudotropheus zebra*, on the other hand, has a typical *Haplochromis* apophysis (see Fig. 15).

Thus, in these three species (*P. macrophthalmus*, *P. williamsi* and *P. zebra*, in that order) the structural–morphological gap between the *Tropheus* and *Haplochromis* apophyseal types is bridged. That the species are members of a monophyletic assemblage seems certain when their shared dental and other cranial specializations are taken into account.

Returning now to those species in which the apophysis is not of the modal *Haplochromis* type. All show certain affinities with the *Tropheus* type but cannot be included in that category if the whole apophyseal structure is considered.

Haplochromis annectens (Regan) has very small basioccipital facets which contribute only to the posterolateral angles of the articular surface, and have noticeably domed, rather than flattened or gently rounded articulatory surfaces. Since, however, the anteroventral end of the basioccipital (on which the facets are developed) is clearly produced into a pair of ventrally directed processes of the *Haplochromis* type, and because the facets contribute to the articular surface, the apophysis is essentially a *Haplochromis* one. The two skulls studied have neurocranial lengths of 27 and 33 mm respectively.

Haplochromis euchilus Trewavas. (Fig. 16). The apophysis in a skull 23 mm long very closely approaches that in the Tanganyika genus *Hemibates* (see p. 309). The basioccipital reaches the level of the parasphenoid but the ventral tips of its processes, like those in *Hemibates*, are not expanded into flat facets. Instead, each tip is slightly expanded and somewhat rounded. In the skull of *H. euchilus* examined, the left facet is rather more elongate than is the right one, and is somewhat less clearly circumscribed.

As compared with *Hemibates*, the apophysis in *Haplochromis euchilus* is very slightly less inflated, and the basioccipital 'facets' are relatively larger and provide a nearly continuous plane with the parasphenoidal facet. (In *Hemibates* the basioccipital 'facets' slope dorsally away from the plane of the major facet of the parasphenoid.) In this latter feature the apophysis of *H. euchilus* approaches the *Haplochromis* condition more closely than does that of *Hemibates*. However, it is still difficult to classify the *H. euchilus* type more precisely than as 'modified *Haplochromis*'.

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[1] ie *Petrotilapia*, *Pseudotropheus*, *Labeotropheus*, *Cyathochromis*, *Melanochromis*, *Genyochromis*, *Labidochromis*, *Corematodus*, *Docimodus*, *Lethrinops*, *Chilotilapia*, *Hemitilapia*, *Rhamphochromis*, *Trematocranus*, *Aulonocara*, *Diplotaxodon*, *Gephyrochromis* and *Lichnochromis*.

Its close resemblance to the apophysis in *Hemibates* from Lake Tanganyika is of particular interest but for the moment it cannot be given any particular phylogenetic significance (see p. 321).

Corematodus taeniatus Trewavas, has the anteroventral margin of the basioccipital greatly produced ventrally into a pair of pillar-like processes (at least in a skull 34 mm long). The anterior margin of each 'pillar' reaches the level of the parasphenoid articular surface (which is indented laterally to receive the process), but its entire facet-like ventral surface slopes so steeply upwards and away from the parasphenoid that the 'facet' cannot contribute to the articular surface for the pharyngeal bones.

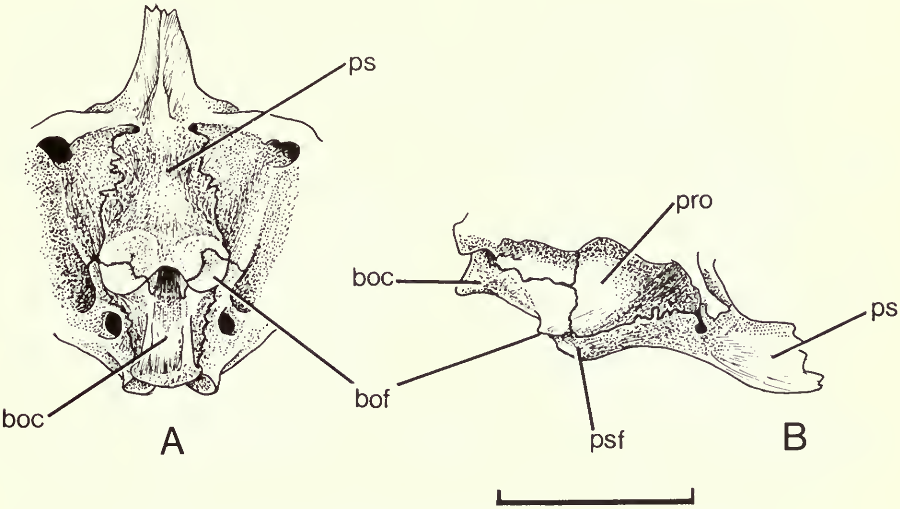

Fig. 15 *Pseudotropheus zebra*. Apophysis in A: Ventral and B: Right lateral views. Scale = 5 mm.

However, the morphology of the basioccipital, and its contribution to the overall structure of the apophysis, is that of a *Haplochromis* and not a *Tropheus* type. The apophysis in the only available skull (NcL: 31 mm) of *C. shiranus* Blgr. (type species of the genus) is very like that of *C. taeniatus* except that the facet-like tips of the basioccipital processes are not so expansive.

Hemitilapia oxyrhynchus Blgr., type and only species of the genus, has an apophyseal form (in skull 25 mm NcL) resembling that in *Corematodus*, but it is broader and lower, with the result that the basioccipital processes appear shorter and less pillar-like, and the 'facets' are less well demarcated.

Seemingly these four species should be included in the category of 'modified *Haplochromis* type apophysis', a category to which *H. chrysontous* and *H. guentheri* (see p. 316) should also perhaps be added. Additional material of the two latter species must be studied to determine their apophyseal relationships more precisely.

Apart from the few *Haplochromis* species discussed above, and those with a *Tropheus* or *Tropheus*-like apophysis (see p. 314), all the other Malawi species of that genus which I have examined[1] do have a typical *Haplochromis* apophysis. There is of course, some variation in its gross morphology, and in the shape and relative size of the basioccipital facets; the latter are relatively larger in species with enlarged pharyngeal bones, a well-known phenomenon in species of that genus and its close relatives (see Trewavas, 1935 : 70; Greenwood, 1965 & 1974 : 75, fig. 44).

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[1] *Haplochromis lateristriga, H. livingstoni, H. macrostoma, H. melanotus, H. nototaenia, H. orthognathus, H. placodon, H. polystigma, H. rhoadesi, H. similis, H. sphaerodon, H. strigatus, H. tetraspilus, H. venustus, H. woodi.*

Lake Victoria

The two endemic *Sarotherodon* species (*S. variabilis* (Blgr.) and *S. esculentus* (Graham)) have typical *Tilapia*-type apophyses and require no further comment.

Far more noteworthy is the fact that none of the currently described *Haplochromis* species (Fig. 17), nor the related monotypic genera (see Greenwood, 1974), has an apophyseal structure or form that departs significantly from the modal *Haplochromis* type (a generalization which perforce excludes the 19 species (out of a total of 105) for which no skeletal material is available, and the large number of known species still awaiting description).

As in the Lake Malawi *Haplochromis* there is some variation in apophyseal shape, and in the relative contribution of the basioccipital facets to the total articular surface (see Greenwood, 1974 : 75).

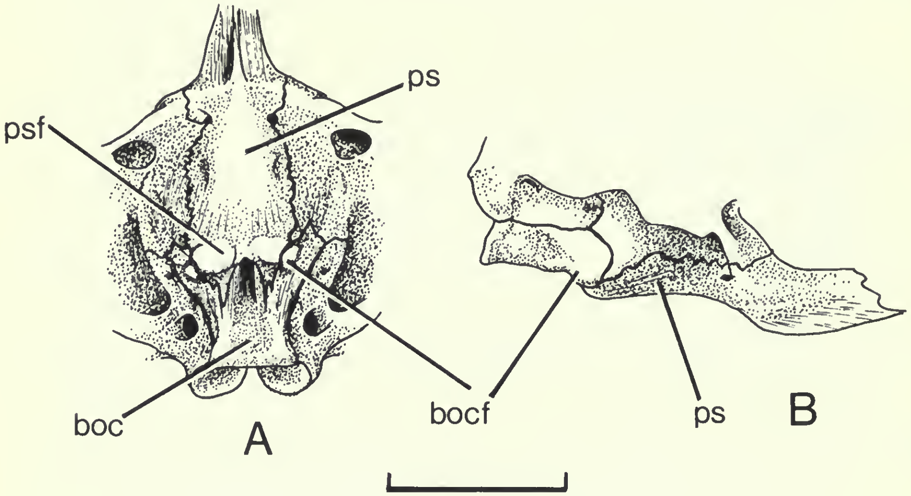

Fig. 16 *Haplochromis euchilus*. Apophysis in A: Ventral and B: Right lateral views. Scale = 5 mm.

Riverine genera

Although I have examined the apophysis in several fluviatile species of *Haplochromis* and *Serranochromis* (all of which have typical *Haplochromis* type apophyses), detailed comments will be confined to representative species of six genera which have not been discussed so far, viz. *Hemichromis*, *Pelmatochromis* (*sensu lato*, see Thys van den Audenaerde, 1968), *Pseudocrenilabrus*, *Chilotilapia*, *Steatocranus* and *Teleogramma*.

HEMICHROMIS

I have examined the type species, *H. fasciatus* (Peters), and find, as did Regan (1922), that the apophysis is essentially of the *Haplochromis* type. In a skull 29 mm long, the basioccipital facets are large, the basioccipital itself contributes to almost half the lateral wall of the apophysis, and the anterolateral part of the wall is formed from the prootic. The parasphenoid only contributes to a small anteroventral part of the apophyseal body (and, of course, to the articular surface as well).

In the specimen of *Hemichromis bimaculatus* (Gill) examined (NcL: 17 mm), the pharyngeal bones are slightly enlarged, and many of the pharyngeal teeth, both upper and lower, are coarse and molariform to submolariform. The apophysis, which is a typical *Haplochromis* one, reflects these features in its relatively large basioccipital facets (see Greenwood, 1974 : 75, fig. 44).

PELMATOCHROMIS

The taxonomic status of this nominal genus is most confused (see Thys van den Audenaerde, 1968, and Trewavas, 1973a). For that reason the species listed below are not grouped in the 'generic' categories proposed by Thys van den Audenaerde (1968).

1 *Pelmatochromis buettikoferi* Steindachner; NcL: 22 mm.
In this, the type species of the genus, the apophysis is somewhat inflated and has a *Tilapia* type structure resembling that in *Cyphotilapia* and *Boulengerochromis* (see p. 306) more closely than the modal type found in *Tilapia* and *Sarotherodon* species.

2 *P. kingsleyae* (Blgr.); NcL: 20, 22 and 29 mm.
The apophysis is relatively tall and has a basic *Tilapia*-type structure except that the articular area of the parasphenoid is relatively thinner, and the basioccipital contributes somewhat more extensively to the lateral walls.

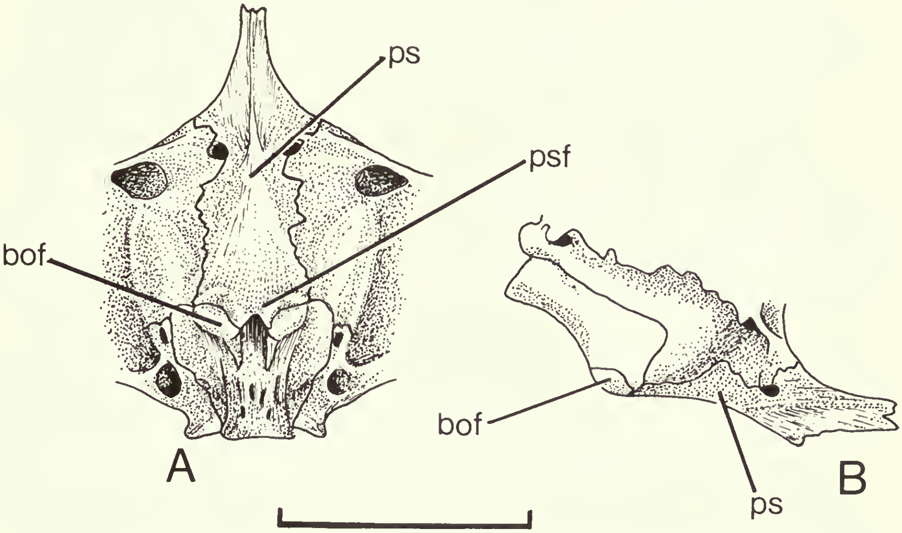

Fig. 17 *Haplochromis obliquidens.* Apophysis in A: Ventral and B: Right lateral views. Scale =5 mm.

3 *P. batesii* Blgr.; NcL: *ca.* 20 mm.
Although essentially like that in *P. kingsleyae*, the apophysis in this species differs in having the articular surface of the parasphenoid extending posteriorly beyond the level of its basioccipital buttress, which it thus overlaps slightly.

4 *P. pulcher* Blgr.; NcL: *ca* 15 mm.
Apart from being a little more inflated and squatter, the apophysis in this species is otherwise like that in *P. kingsleyae.*

5 *P. kribensis* Blgr.; NcL: *ca* 13 mm.
The apophysis is like that of *P. pulcher.*

6 *P. subocellatus* (Günth.); NcL: *ca* 15 mm.
The somewhat inflated apophysis is essentially a *Haplochromis*-type structure and thus unlike those in the other species examined. It differs from the modal *Haplochromis* condition in having small basioccipital facets, and a parasphenoidal articular surface that is not indented laterally to receive them.

PSEUDOCRENILABRUS

The status and nomenclature of this genus are discussed by Trewavas (1973b), and its behaviour patterns by Wickler (1963). It was on the basis of its behaviour and certain secondary sexual features that Wickler (1963) suggested the taxon should be removed from the genus *Haplochromis* in which it was then placed.

1 *Pseudocrenilabrus multicolor* (Schoeller); NcL: 16 mm; skull from a specimen *ex* Lake Nabugabo, Uganda.
In all respects the apophysis is a typical *Haplochromis* one; it has relatively large basioccipital facets.

2 *P. philander* (Weber); NcL: 23 mm; skull from a specimen *ex* Umfuluzi river, Kwa-Zulu.
The apophysis is identical with that in *P. multicolor*.

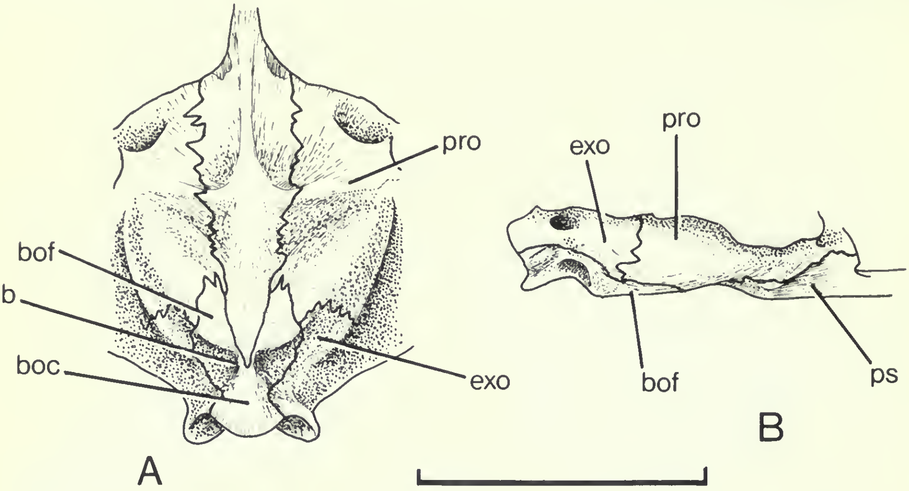

Fig. 18 *Teleogramma gracile*. Apophysis and otic skull region in A: Ventral and B: Right lateral views. Scale = 5 mm.

CHILOCHROMIS

The apophysis in *Chilochromis duponti* Blgr., the sole representative of the genus, was described as apparently having '. . . the same structure as in *Otopharynx*' (Regan, 1922). The apophysis in *Otopharynx* Regan, an endemic Lake Malawi taxon, was described as being formed from the parasphenoid and prootic alone, an unusual combination of bones. Trewavas (1935), however, considered that both *Otopharynx auromarginatus*, the type species, and *O. selenurus*, the other species referred to the genus, had apophyses of the *Haplochromis* type (see p. 313).

In my opinion the apophysis of *O. auromarginatus* (see p. 315) is not a typical *Haplochromis* one as Trewavas (1935) thought, but is more like the *Tropheus* type. Thus it was of particular interest to check on the apophyseal structure of *Chilochromis duponti*, a somewhat difficult task since only one specimen, an entire fish, was available for study; the skeleton which Regan (1922) apparently studied cannot be located.

As far as I can tell from a unilateral and partial dissection of the pharyngeal region of this fish, the articular surface of the apophysis is, as Regan (1922) described it, formed from the parasphenoid in the middle and from large prootic facets laterally. The basioccipital seems only to serve as a posterior buttress to the parasphenoid.

If this arrangement of the bones is confirmed in other specimens, then *Chilochromis* has a unique type of apophyseal structure, and one which could be derived from either a *Tylochromis* or a *Tilapia* type (see p. 299 & p. 301).

STEATOCRANUS

Regan (1922) placed this genus in his *Haplochromis* group, but Roberts & Stewart (1976 : 292) note 'Pharyngeal apophysis formed exclusively by parasphenoid bone' (presumably referring, as did Regan, to the articular surface and not the entire structure); these authors do not indicate which species they examined.

Unfortunately I cannot locate, with certainty, the specimen of *S. gibbiceps* Blgr., that Regan studied; however, there is one fish (1899.6.28:26) in which the gill arches have been removed, and which might be that used by him. The apophysis in this fish (60 mm SL) is basically of the *Tilapia* type and resembles that in *Simochromis dardennii* (see p. 306; Fig. 7A & B).

A specimen of *S. casuarius* Poll (NcL: 15 mm) also has an apophysis of the same type.

TELEOGRAMMA

Regan (1922) did not include this genus in his review of taxa not restricted to the Great Lakes, nor, as far as I am aware, has its pharyngeal apophysis been described elsewhere.

Teleogramma gracile Blgr. (type species of the genus); NcL: 12 mm.
The extraordinarily depressed skull, and greatly inflated otic region, has, as might be expected, led to an equally unusual pharyngeal apophysis (Fig. 18). It is broad and laterally expansive, with the articular surface formed mainly from the enlarged basioccipital facets; the parasphenoidal contribution is reduced to a narrow medial tongue of bone. Thus, the apophysis is essentially of the *Haplochromis* type, albeit the most modified form encountered in this survey.

Discussion and conclusions

If the structure of the entire pharyngeal apophysis and not just that of its articular surface is taken into account, then Regan's (1920) division of the African genera into *Tilapia* and *Haplochromis* types breaks down. Instead four modal apophyseal types have to be recognized, namely: *Tylochromis*, *Tilapia*, *Tropheus* and *Haplochromis* (see pp. 299–302); a fifth type, *Chilochromis*, may also exist (see p. 320).

Morphologically, the dividing line between the *Tylochromis* and the *Tilapia* types is quite clear cut, despite their structural simplicity. The difference between the *Tilapia* and *Haplochromis* types is even more trenchant because in the latter the basioccipital contributes to the articular surface for the upper pharyngeal bones as well as to the support of that surface (see p. 304).

Problems arise with the *Tropheus* apophyseal type, for although it has a distinctive form in most of the species possessing it, it is structurally intermediate between the *Tilapia* and *Haplochromis* types. Consequently, there are some taxa where the apophysis could be classified as a modified *Tilapia* type or, more frequently, as a modified *Haplochromis* type in which the basioccipital facets are not fully developed.

Apophyseal structure and form in three species of the Lake Tanganyika genus *Simochromis* illustrate this particular difficulty. *Simochromis diagramma* seems almost to have a *Haplochromis* type apophysis (see p. 310), but in *S. babaulti* the apophysis approaches the modal *Tropheus* type (p. 310), whilst in *S. dardennii* it closely approximates to the true *Tilapia* type save for some features (the extent of the basioccipital contribution to the side walls, for example) which are *Tropheus*-like (see p. 306). Thus, on apophyseal structure alone it is impossible to tell whether *Simochromis* evolved from an ancestral species with a *Tilapia*-type apophysis or one with a *Haplochromis* type.

This example, and the one that follows, are particularly instructive because in each the species involved share specialized dental and osteological characters indicative of their respective monophyletic origins. In other words, there can be a considerable range of apophyseal structure within a single phyletic lineage.

In the Lake Malawi genus *Pseudotropheus*, at least one species (*P. macrophthalmus*) has a *Tropheus* type apophysis, while two others have definite *Haplochromis* types (*P. williamsi* and *P. zebra*); see pages 315–316. Here again it is impossible to determine the direction of evolution in apophyseal structure.

It might be stressed that in neither example can any evidence be found to suggest that the 'generic' characters are the results of convergent evolutionary trends.

The structural intermediacy of the *Tropheus* type apophysis poses particular difficulties when attempting to demonstrate the interrelationships of the Lake Tanganyika cichlid flocks. Here, unlike Lakes Malawi and Victoria, a large proportion of the endemic species can be classified as having a *Tropheus*, or modified *Tropheus* type of apophysis (see pp. 307–310). If the *Tropheus* apophyseal type could be a structural modification of either a *Haplochromis* or a *Tilapia* one, there is good reason for not assuming *a priori* that species with a *Tropheus* type apophysis are members of a single and distinct lineage nor, without the use of other characters, is it possible to know the sister-group relationship of species with this type of apophysis.

Species with a *Tropheus* type apophysis do, we now know, occur in Lake Malawi as well. For the same reasons as in Lake Tanganyika it is impossible to decide on their phyletic affinities, both within the lake and also, in this case, with the *Tropheus*-type species of Lake Tanganyika.

Wickler's (1963) research into the reproductive ethology of *Tropheus moorii* has already indicated some features which may be of value in elucidating such sister-group relationships. But, the search for phylogenetically useful anatomical features has not yet really begun, and we know too little about ethological features to evaluate them in terms of their primitive or derived status.

Finally, it must be remarked that the morphologically more circumscribed *Haplochromis*, *Tilapia* and *Tylochromis* apophyseal types are each only assumed to be of monophyletic origin, an assumption that could be cast into some doubt by the situation seen in *Simochromis* and *Pseudotropheus* (see above).

The uncertainties expressed by Wickler (1963), and echoed by Fryer & Iles (1972 : 504), on the phylogenetic validity of Regan's (1920) grouping of the African Cichlidae into two lineages are reinforced by the results of this more detailed analysis of the character complex on which the dichotomy was based. As a consequence of Regan's *Tilapia* division being at least dimorphic (*Tropheus*+*Tilapia* types), and because one of its constituent parts (the *Tropheus* group) may itself be polyphyletic, Hoedeman's (1947 & 1974) formal recognition of the *Haplochromis* and *Tilapia* groups as subfamilies is invalidated (see p. 298).

For the moment it seems, indeed, that the pharyngeal apophysis must be rejected as a character of any value in formulating suprageneric interrelationships and that it is probably of little or restricted value in classification below that level as well.

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